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Speeding Frontier Formalities in Western Germany

IMPORTANT savings in rail passenger time and expense as well as economies in operation are expected to result from preliminary agreements reached in the United Nations at Geneva recently to reduce the delays for customs formalities of international trains at the frontiers of Western Germany. The decreases in delays will come from passport, customs, and currency inspection in trains on the move, and also from agreements to permit officials of one country to begin inspection of passports on the territory of another. The agreements were discussed between customs, police, finance, and railway authorities of Belgium, Denmark, France, the Netherlands, Switzerland, and Occupation Authorities and railway experts from the Western Zones of Germany at a three-day meeting called by E.C.E. Substantial reductions in delays and savings in travel time were agreed for 22 main international trains. Another object of the meeting was to reduce train delays as close as possible to the time required for railway operations, such as inspections of carriages and brakes, filling of water tanks, and changing of staffs and engines. Certain accelerations of service between Holland and Germany will be effected on October 8 and most of the improved services and schedules will come into force on May 21 next year.

East Indian Railway Reunion

THE 47th annual reunion dinner of the officers of the East Indian Railway was held in London on September 27, with Mr. S. J. P. Cambridge in the chair. This year the reunion had an added significance, because a quarter of a century has elapsed since the railway system passed over to State management, on January 1, 1925. The East Indian Railway was the earliest railway undertaking in India, being inaugurated in 1849, and in August, 1854, the line was opened to traffic between Howrah and Hoogly, about 23 miles in length; within a few months it was further extended to Ranugunge. During his speech at the dinner, which is reported elsewhere in this issue, the Chairman referred to the changes which had taken place during his 38 years of service, which had included the amalgamation of the Oudh and Rohilkund and the East Indian Railways, which led to certain difficulties eventually overcome. Mr. Cambridge also referred to the present proposed regrouping under which the E.I.R. will extend from Howrah to Kanpur, and will include that portion of the old Bengal North Western Railway, now the Oudh and Tirhut, east of Chupra, the Assam Railway, and the coal fields of the Bengal Nagpur Railway.

Tests of 50-Cycle Motor Coaches

TRIALS have begun in the French Zone of Germany with the first of three electric motor coaches destined for service on the line from Aix les Bains to La Roche-sur-Furon. This route is being electrified at 20,000 V., 50 cycles (see our February 24 issue), and the motor coaches are equipped with 50-cycle a.c. traction motors of new design, built to the specification of the French National Railways. They are claimed to be the first vehicles of their kind for operation on standard commercial frequency a.c. The new vehicles are conversions from existing motor coaches with 16⅔-cycle motors, and are additional to the three prototype 50-cycle locomotives referred to in the above article, and in our issue of June 17, 1949. The new motor coaches are suitable for individual or multiple-unit operation. Each is powered by two motors, giving a total of 960 h.p. The transformer and equipment compartment is suitably fitted up for observing and recording performance during the trials. Accommodation is provided for 61 passengers. On one occasion so far the first motor coach has climbed a 1 in 18 gradient at 40 m.p.h., and an acceleration of 2·2 m.p.h. per sec. has been recorded with an increase of 50 per cent. in the normal 1-hr. rating current.

Improved Services on Estoril Line

DURING this year the Estoril Electric Railway, Portugal, has placed in service all the electric rolling stock ordered from The General Electric Co. Ltd., the deliveries being completed by the Bo + Bo mixed traffic locomotive described elsewhere in this issue. Previously, the railway had received the two motor coaches and five trailers described in our issue of May 19. The mechanical parts of the locomotive have been built by The North British Locomotive Co. Ltd., and the builder of the motor coach and trailer stock was Cravens Railway Carriage & Wagon Co. Ltd. These additions have enabled the railway to introduce a considerably augmented summer timetable. Services from Lisbon to Cascais increased from 42 daily in 1949 to 51, and an innovation this year is the introduction of 13 stopping trains from Lisbon to the new Estadio branch, giving connections at Cruz Quebrada into and out of semi-fasts to Cascais. An acceleration of 2 min. has been made in the schedules of morning and evening business services running non-stop between Lisbon and S. Joao de Estoril, and there are numerous cuts in the station-to-station times of stopping and semi-fast trains. The G.E.C.

North British electric locomotive described this week is working passenger trains composed of the new trailers, but its design provides also for hauling 600-ton goods trains at a maximum speed of 30 m.p.h.

Pitfall Subsidences

THE recent disaster at a Scottish colliery caused by a large-scale subsidence of land is a reminder of the increasing extent to which British Railways are suffering from the same cause. Regions are put to considerable expense in maintaining lines in safe running order and the effect on operation also is serious. Before the war, the L.M.S.R. made the run of 39½ miles between Sheffield and Leeds in 48 to 50 min., whereas today the time needed is 65 to 67 min. In the Midlands, where even before the war running was affected by the pitfall danger, the 47 miles between Leicester Midland and Chesterfield could be run in 57 min., whereas the best times today are 79 min. down and 74 min. up. In the 1930's the L.M.S.R. grappled with a similar difficulty at Polesworth, and by buying up the mineral rights under the line restored the track to a safe condition for fast running, though this proved an expensive cure. The North Eastern and Scottish Regions also appear to have dealt successfully with their pitfall difficulties between Darlington and Newcastle and Edinburgh and Glasgow. The question calls for some understanding in the future between British Railways and the National Coal Board.

Intensive Wagon Building in U.S.A.

DRASTIC measures are being set on foot in the United States to overtake the present shortage of wagons. At a special meeting on July 28 of the Association of American Railroads, the member lines decided to build up their wagon stock by 122,000 units from its present total of 1,728,000 to 1,850,000 units, all, of course, bogie wagons in accordance with standard American practice. Within a matter of days large-scale orders had been placed by some of the major railways, as, for example, 6,001 for the New York Central System, 5,000 for the Pennsylvania, 3,500 for the Union Pacific, and 1,225 for the Seaboard Air Line. The goal of 1,850,000 wagons will include roughly 775,000 box wagons, 575,000 hopper wagons, 325,000 "gondolas" or open wagons, and 55,000 flat wagons. It is hoped that the manufacturers will supply at least 10,000 wagons monthly, if the shortage of steel can be overcome, and at the same time an extensive programme is being undertaken to renovate and modernise existing wagons and to reduce the present total of wagons out of order from 6·5 per cent. to not more than 5 per cent. of the total stock.

Fatigue Failures in Locomotive Wheels

A FURTHER derailment in the United States of a freight train resulting from the breakage of a driving wheel on a diesel locomotive has brought into prominence the practice of stamping identification markings on steel wheels. In this case the crack which ultimately caused fatigue failure started from lettering which had been stamped on the rim of the wheel during manufacture to a depth of ¼ in.; after the fracture, 13 further incipient cracks were found developing in the same wheel from corners in the stamped lettering. The method of stamping has been standard for years, and has been applied to very large numbers of wheels, but it was not until 1946 that the first failures from this cause were reported in the U.S.A. Since then 21 wheels have failed in service and 15 more have been discovered to be cracked. The remarkable feature is that the cracks and failures have been exclusively in the driving wheels of diesel-electric locomotives and predominantly on railways with long and severe gradients. Heating due to continuous braking cannot be the sole cause, or there might have been similar failures of wheels carrying high-speed passenger stock, or of wheels subjected to heavier loading in other types of locomotive.

F.B.I. and Surplus Railway Capacity

IN our issue of September 22, we dealt briefly with a memorandum which the Federation of British Industries had sent to the Ministry of Transport on the "strategic value and under-utilisation of the railways." This memorandum, no doubt because of the importance of the organisation which compiled it, has received a good deal of publicity in various sections of the press. The views of so large a group of British Industries merit close attention, but in examining them it cannot be overlooked that they are based on a very natural desire to achieve the lowest possible railway charges. That in itself is commendable, provided that other factors are equal.

The memorandum pointed out that the main duty of the British Transport Commission is to secure "an efficient, adequate, economical and properly integrated system of public transport." The F.B.I. interprets this phrase as implying the characteristics of good service, low cost, matching facilities with the probable future demand, and the maximum utilisation of those facilities. It adds that there is evidence that the capacity of the railway system generally appears to be a good deal higher than is necessary to absorb peak demands in a normal peacetime economy. The maintenance of surplus capacity at such times, it argues, imposes a burden on the charges paid by the trader and in effect current charges carry an element of subsidy for under-utilised capacity.

The F.B.I. does not define what it means by "low costs." If it suggests something less than cost, it cannot be economic, and the F.B.I. definition cannot be commercially sound, for no business can be conducted on this basis and pay its way. The general level of railway freight charges is 81 per cent. above pre-war, whereas the similar general level of railway costs is up about 120 per cent. It is extremely unlikely that any of the industries associated with the F.B.I. have to conduct their business on this basis. If rail charges and costs had been placed in proper equilibrium after the war, as would have been the case in any other commercial enterprise—and as indeed was provided in the railway control agreement on the assumption that railways would be handed back to private enterprise—the financial obligation of the railways would have been met in full.

Although the F.B.I. memorandum says that "there is much evidence" that the capacity of the railway system generally "appears" to be a good deal higher than is necessary, it does not produce any of this evidence or indicate what it is. If it is meant that full cost is not being met, we have already dealt with the point. There is, of course, no subsidy for under-used capacity; on the contrary, trade and industry are being subsidised to the extent that railway charges are below their economic level. In any event it is pertinent to bear in mind that at the present time British Railways are carrying a greater volume of business than they did in the pre-war years, notwithstanding the contraction that has occurred since the end of the war.

The memorandum agrees that economies from a "careful integration" of all public forms of transport may be reflected ultimately in reduced charges, and that this may result in bringing back to the railways some traffic which has been lost. On the other hand, it contends that the rapid development of motor transport will effect a substantial and permanent loss of traffic to the railways, and that there have been other similar factors such as alterations in the patterns of production and distribution. The consequences of changes resulting from the development of road transport and also shifts in production and distribution patterns have had to be faced by the railways in the past. The objective of the 1947 Transport Act is the complete co-ordination of road and rail and, therefore, it may be taken that this point of the F.B.I. memorandum is already being dealt with by the British Transport Commission.

Dealing with the evidence given by the British Transport Commission at recent charges hearings, that there was relatively little prospect of substantial economies resulting in lower charges in the near future, the F.B.I. goes on to ask whether any alterations of the main elements of railway organisation, operating methods, and financial structure can be devised to reduce transport costs. This is a matter which

necessarily must be dealt with by the Railway Executive and the British Transport Commission. A unification of each form of transport is already in process and ultimately the various agencies will be co-ordinated. It seems unlikely that anything more than this could be devised. Moreover, when the F.B.I. goes on to say that a margin of railway capacity must be retained for emergency use, it is reasonable to point out that railways in this country are not normally organised for war purposes and there has never been any Government requirement that they should be. The proposal by the F.B.I. that the Defence and Supply departments should be invited to say how much capacity must be retained for emergency purposes, and that the cost of maintenance could then become a charge on the Defence estimates, pre-supposes a form of warlike economy which is completely foreign to Great Britain. Moreover, if part of the railway system is to be maintained by a charge on the Defence estimates, the principle of a subsidy is involved just as clearly and completely as if the railways were accorded a grant from the general pool of taxation. We have already stated the objection to a subsidy on numerous occasions and they apply equally well to the proposition put forward in the present memorandum.

In any event, before it is possible for an estimate to be made of this so-called surplus or under-used capacity which the F.B.I. thinks should be retained for emergency purposes, it suggests that there is an urgent need for a survey of all transport facilities, and that those not required should be considered redundant and dismantled or allowed to fall into disuse. In fact, surveys of this kind are a normal part of the work of the British Transport Commission and its Executives under the Transport Act. Our own columns give regular evidence of the numbers of stations and so forth which are closed to traffic, or to particular kinds of traffic, and if space permitted, a number of other instances could be given.

Southern Region Winter Timetables

THE winter timetable book of the Southern Region, in conformity with the "area" plan to which we have referred previously, bears the title "Passenger Services, London—Victoria, Waterloo, Charing Cross, London Bridge, Cannon Street, Holborn Viaduct—South and West of England (including Suburban Services)." As with the Western Region book, however, there is as yet no sign in the Southern book of the recent Regional exchanges of territory saving the inclusion in the latter of the *ex*-Western Region Reading-Basingstoke, Didcot-Newbury-Winchester-Southampton, and Cheltenham-Swindon-Andover services. For some time past these have been shown as supplementary tables in the Southern Region book, but in the new issue Table 74 becomes a comprehensive table of the entire train service between Reading and Basingstoke and Winchester, Newbury and Winchester, and Winchester, Southampton, and Redbridge; similarly, Table 73 runs through between Westbury and Salisbury in the north, and Southampton and Portsmouth in the south. Rather curiously, this information is duplicated by the retention in the book of the previous Bath Spa-Westbury-Salisbury and Reading-Basingstoke tables (80 and 82 respectively).

The accelerations over the Southern Region which figured in the announcements concerning the winter train services proved to be exclusively in comparison with the services of last winter, and all of them have been in operation since June 5 last. As compared with last winter, there are additional trains on weekdays from Victoria at 10.35 a.m. to the Kent Coast, and in the reverse direction at 1.55 and 5.22 p.m. from Ramsgate to Victoria. The last evening service from Victoria to Eastbourne and Littlehampton, leaving at 10.25 p.m. last winter, is now 10.45 p.m. The through express between Bournemouth West and York reaches York at 7.42 instead of 7.29 p.m., but this deceleration is entirely over the Eastern Region. The "Pines Express" this winter includes through coaches to and from Sheffield, in addition to the main Liverpool and Manchester sections.

London Midland Region Winter Train Services

THE winter timetable book of the London Midland Region is again in the enlarged format introduced in June last, but with pages reduced direct from the station sheets, with the result that many of the tables still appear in microscopic type. In common with the area titles to which we have referred previously, the cover bears the inscription, "Passenger Services (Including Suburban Services) London (Euston, St. Pancras) The Midlands, North Wales, The North."

The principal train service improvement is the restoration of two pre-war trains between Euston and Wolverhampton—the 8.5 a.m. down, calling at Watford and due Coventry 9.58, Birmingham 10.29, and Wolverhampton 11.4 a.m., and the 10.55 a.m. from Wolverhampton, 11.30 from Birmingham, and 11.56 from Coventry, due Euston at 1.44 p.m. The latter is named the "Midlander," and the named stock returns from London with the 5.45 p.m. from Euston. To bridge the existing gap in down services to Birmingham and Wolverhampton between the 11.10 and 11.25 a.m. from Paddington and Euston respectively, and the 2.10 and 2.15 p.m. pair, the 11.25 p.m. is altered to start at 12.30 p.m., omits the Blisworth stop, and reaches Birmingham at 2.50 and Wolverhampton at 3.22 p.m. The 4.35 p.m. from Euston to Birmingham and Wolverhampton calls at Watford to pick up, and is diverted to stop at Northampton instead of at Blisworth, and then calls at Rugby to give connection from Watford and Northampton to the 5.5 and 5.20 p.m. expresses from London. Birmingham is reached at 7.21 instead of 7.2 p.m.

The stops at Watford Junction of the 8.5 a.m. and 4.35 p.m. from Euston to Wolverhamption, as well as a new stop of the 7.30 a.m. from Holyhead to Euston (with excellent connections at Crewe from Liverpool, Manchester and Preston) are, like those introduced in the summer timetable at Watford of the 4.5 p.m. from Manchester and the 4.10 p.m. from Liverpool to Euston, in response to local requests for better direct service between this important traffic centre and the chief provincial cities served by the London Midland Region. As a result, Watford Junction has now the best main-line service that it has enjoyed at any period of its history (other than the war period, when because of enemy raids most expresses called there); down expresses calling comprise the 8.5 a.m., 8.55 a.m. and 4.35 p.m. Euston to Wolverhampton, the 8.15 a.m. "Irish Mail" (summer only), the 8.30 a.m. Liverpool, the 8.35 a.m. Manchester, the 10.50 a.m. North Wales and Blackpool, and the 11.32 a.m. Crewe; the up expresses stopping are those due in Euston at 5.12 a.m. from Glasgow, 11.22 a.m. from Crewe, 1.37 p.m. from Holyhead, 7.15 and 10.57 p.m. from Birmingham, 8.5 p.m. from Manchester, 8.28 p.m. from Liverpool, and 10.9 p.m. from Glasgow, providing an excellent balance of through working and connections in each direction which already is being well patronised.

The "Royal Scot" maintains its summer arrival times at 6.25 p.m. in Glasgow going north and 6.13 p.m. in Euston coming south, the former including the usual winter stops at Rugby, Crewe, and Carlisle, but this has been made possible chiefly by acceleration in the Scottish Region. After some years, the southbound train resumes its stop in Carlisle Citadel station, instead of south of the station to change crews only, as previously. The 1.15 p.m. "Midday Scot" from Glasgow to Euston now has permanent stops at Lancaster, Preston, and Watford, in addition to those at Motherwell, Carstairs, Carlisle, and Crewe. There is a further acceleration of the 5.20 p.m. from Euston to Holyhead, by the omission of the stops at Beeston Castle and Llandudno Junction, and arrival at Holyhead now is at 10.53 p.m., 17 min. earlier; through coaches between Euston and Birkenhead by this train are restored for the first time since the war.

Improvements are made in the service between Birmingham, Liverpool, and Manchester; the 8.25 a.m. from Birmingham ceases to call at Stafford, and reaches Liverpool at 10.41 a.m. and Manchester at 10.40 a.m., accelerations

of 17 and 16 min. respectively. A new facility on this train is a buffet car between Birmingham and Manchester, which returns from Manchester at 4.35 p.m. Also, a restaurant car is provided on the 11.40 a.m. from Liverpool to Birmingham, returning as a dining car on the 6.5 p.m. from Birmingham. The 3.45 p.m. from Liverpool to Hull starts at 3.55 p.m., and is accelerated 13 min. This winter the 9.5 a.m. from Liverpool and the 9.25 a.m. from Manchester to the West of England, now starting at 9.15 and 9.20 a.m. respectively, are combined as a single train from Crewe; as compared with last winter, the journey time from Manchester to Plymouth is unaltered, but from Liverpool it is 35 min. quicker.

On the Midland Division there is a further slowing of all express trains between Leicester, Nottingham, Sheffield and Leeds, by an average of 10 min. each, as a result of additional speed restrictions through the mining areas. An interesting improvement of service is the provision of a buffet car on the 9 a.m. from Nottingham to Derby, Manchester, and Liverpool, returning on the 3.30 p.m. from Liverpool Central. New restaurant car facilities also are provided on the 12.13 p.m. from Derby to Leeds and Bradford, and the 4.38 p.m. from Bradford to Derby.

British Transport Commission Traffic Receipts

OWING to printing difficulties *Transport Statistics*, No. 8, cannot be published on the normal date, but, meanwhile, the British Transport Commission has issued a summary of the statistics for the period. The principal traffic receipts for the four-week period ended September 10 amounted to £36,201,000. This figure compares with £37,362,000 during the previous four-week period and £34,441,000 for the corresponding period of 1949. For the 36 weeks to date the aggregate amount exceeds that of last year by £5,622,000 or about 1·9 per cent. British Railways receipts for the four weeks under review, £28,206,000, show a reduction of £1,817,000 on the previous four weeks, with an increase of £1,567,000 over the same period last year, while the aggregate of £230,418,000 for the 36 weeks compares with £225,798,000 for the previous year, the comparison between 1950 and 1949 being affected by the increase in rates and charges introduced on May 15, 1950, regarding freight train traffics, parcels, and mails, and, on July 31, 1950, with regard to parcels post. The revenue figures for inland waterways were also affected as from May 15 last.

	Four weeks to September 10		Incr. or decr.	Aggregate to September 10		Incr. or decr.
	1950	1949		1950	1949	
	£000	£000	£000	£000	£000	£000
British Railways—						
Passengers	10,002	10,898	− 896	77,682	83,192	− 5,510
Parcels, etc., by passenger train	2,576	2,327	+ 249	20,831	20,014	+ 817
Merchandise & livestock	6,931	6,235	+ 696	58,560	55,931	+ 2,629
Minerals	2,508	2,179	+ 329	21,774	20,188	+ 1,586
Coal & coke	6,189	5,000	+ 1,189	51,571	46,473	+ 5,098
	28,206	26,639	+ 1,567	230,418	225,798	+ 4,620
Road Passenger Transport, Provincial & Scottish—						
Buses, coaches & trolleybuses	3,602	3,304	+ 298	26,702	25,014	+ 1,688
London Transport—						
Railways	1,058	1,056	+ 2	9,814	9,926	− 112
Buses & coaches ...	2,409	2,485	− 76	21,445	21,826	− 381
Trolleybuses & trams ...	799	840	− 41	7,323	7,574	− 251
	4,266	4,381	− 115	38,582	39,326	− 744
Inland Waterways—						
Tolls	65	50	+ 15	531	473	+ 58
Freight charges, etc. ...	62	67	− 5	584	584	None
	127	117	+ 10	1,115	1,057	+ 58
Total	36,201	34,441	+ 1,760	296,817	291,195	+ 5,622

The decrease in passenger revenue in the case of British Railways over last year, £10,002,000 against £10,898,000, was more than offset by an increase in revenue from coal and coke, £6,189,000 against £5,000,000, minerals, £2,508,000 against £2,179,000, merchandise and livestock, £6,931,000 against £6,235,000. Income from provincial and Scottish road passenger transport operations brought in £3,602,000 or about £298,000 more than last year. On the other hand the operations of London Transport brought in £115,000 less revenue than a year ago at £4,266,000 while the inland waterways produced £127,000 in the four weeks as compared with £117,000 for the same period last year.

PERCENTAGE VARIATION 1950 COMPARED WITH 1949

	4 weeks to September 10	36 weeks to September 10
British Railways—		
Passengers	− 8·2	− 6·6
Parcels	− 10·7	− 4·0
Merchandise & livestock	+ 11·1	− 4·7
Minerals	+ 15	− 7·8
Coal & coke	+ 23·7	+ 10·9
Total	+ 5·8	+ 2·0
Road Passenger Transport	+ 9·0	− 6·7
London Transport—		
Railways	+ 0·1	− 1·1
Buses & coaches	− 3·0	− 1·7
Trolleybuses & trams	− 4·8	− 3·3
Total	− 2·6	− 1·8
Inland Waterways	+ 8·5	+ 5·4
Aggregate	− 5·1	− 1·9

Total traffic receipts of British Railways for the 36 weeks are, however, £545,000 below the total for the corresponding period of 1948. For the 36 weeks, moreover, the passenger receipts are £11,742,000 or 13·1 per cent. below those of 1948, when petrol was rationed and public spending power was considerably higher than it is today. Total receipts of London Transport are in the aggregate £1,146,000 or 2·8 per cent. below those of 1948.

U.S.A. Railways' Wagon Stock

OUR August 25 issue recorded the views of Mr. W. T. Faricy, President, Association of American Railroads, on the subject of wagon supply. Speaking on May 23, he said that concentrated efforts were under way to increase the number of wagons on order. On July 28 the Association held a meeting of its 132 member companies at Chicago and reached agreement to increase the total stock of wagons from the present figure of 1,728,000 units to 1,850,000, or by 7 per cent., as quickly as possible.

It is hoped that new wagons will be produced at the rate of 10,000 a month by January, 1951, but far more than a year's output at that rate will be needed to add 122,000 units to the stock. For some time about 6,000 obsolete wagons have been scrapped each month. It is proposed to reduce the number of withdrawals by renovating many of the older wagons in the present fleet. An immediate effort will be made, also, to reduce the bad order percentage from 6·5 to 5 per cent. of the current stock.

At July 31 the number of new wagons already ordered was 103,000. Their prompt delivery will turn largely on an ample allocation of steel from the record quantities which are being produced week by week in the United States. The A.A.R. confidently expects Government support in carrying out its wagon programme. In the meantime, to relieve existing shortages, the Association has appealed to traders for their help in reducing the turnround time of wagons, which spend about half of their working hours in the processes of loading and unloading. The railways pledge themselves to do all in their own power to make the best use of freight rolling stock. During the 5 months to May 31, average wagon miles per wagon day were 39·5; the railways will try to lift the average to 50 miles per wagon per day. With the present brisk demand for wagons, this feat should be practicable as it was performed under the pressure of the war years.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Seat Reservation

September 15

SIR,—On Joining the 11.10 a.m. *ex*-Paddington at Birmingham recently, I found that nearly half the unoccupied seats had above them labels marked "Reserved Seat." It was clear that comparatively few of these passengers could be in the restaurant car, and that in fact most of them had alighted at Leamington, or Birmingham. The more experienced traveller looked at the luggage racks, and not in the "reserved" seats, but others went up and down the train, or sat uncomfortably between the empty corners.

The Eastern Region indicates on its reserved seat label where the seat is reserved to, so that passengers joining intermediately know whether or not there is a seat available. This register, though entailing more labour, would seem worthwhile, especially on a route with much intermediate traffic such as Paddington to Birkenhead, where the present arrangements on the Western Region tend to throw the whole system of seat reservations into disrespect.

Yours faithfully,

R. G. OAKLEY

19, West Way, Pinner

Coach Design

September 13

SIR,—Mr. R. Bell in your issue of August 25, refers to American passenger vehicles. Losses in passenger traffic on long journeys are largely because of the savings in time and money by the use of air transport, a transcontinental trip by rail taking 3 to 4 days as against some 16 hr. by air. On local trips involving short distances (up to 200 miles), the universal ownership of automobiles and cheapness of petrol makes the trip by car more desirable and convenient than by coach. On medium distance journeys of 300 to 1,000 miles sleeping cars and coaches find large usage as well as in suburban and interurban service.

The travelling public in the U.S.A. continually demands, and the railway companies endeavour to supply, modern passenger equipment complete with air conditioning, comfortable seating, attractive and restful decoration, and cleanliness. The modern passenger vehicles have not lost passengers to the companies, but rather retained and regained passengers.

Yours faithfully,

R. D. PFAHLER

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Descriptions of Locomotive Types

September 12

SIR,—I suggest that the practice which has grown up since nationalisation of describing various locomotive types as belonging to such-and-such a Region is quite illogical and that it would be far better to continue to call them by their line of origin, as L.M.S.R. Pacific, or L.N.E.R. J.39.

The absurdity of attempting to apply the Regional distinction to locomotive types is well illustrated by one example, in which, in a recent issue of one of our periodicals, reference was made to an "Eastern Region 4-4-0 of the 'Hunt' class." In fact, not one of the 76 engines of this and the "Shire" class is at work on the Eastern Region, all being stationed either in the North Eastern Region or in Scotland. Again, why necessarily "London Midland Region" engines when referring to the Stanier Class 5 4-6-0s. These are to be found not only on their parent system, but also on what is now the Southern Region (on the S.D.J.R.), the Western Region (at Shrewsbury and Bristol, for instance), and, of course, in the Scottish Region, and as time goes on and interchange of engines between the Regions becomes more widespread (apart from further adjustments of the Regional boundaries) the practice will become more and more illogical and confusing

The Regional boundaries may prove quite satisfactory from a geographical and operating point of view, but I submit that as applied to the locomotive stock they have absolutely no meaning. May I therefore put forward a plea that descriptions of locomotive types go by the line of the origin of the design. After 28 years we still speak of Brighton Atlantics, Midland Compounds, Caledonian Dunalastairs, and so on.

Yours faithfully,

H. C. CASSERLEY

Ravensbourne, Berkhamsted

Westinghouse-Fitted Wagons

August 12

SIR,—Referring to the letter from Mr. Parkes on page 647 of your issue of June 9, this railway has at the moment 21 of 4 ft. 8½ in. gauge, two-axle, 15-ton wagons. They are the residue of a total of 36 in use before the war, of which 22 were covered wagons, three were cattle wagons, nine were open and two goods brakes. They are now about 40 years old and all were originally fitted with the Westinghouse brake. After the re-occupation of the Colony only seven covered wagons had escaped damage and five were converted to brakes with end platforms. The rest were restored as open wagons. Other details are:—

Length between headstocks		19 ft.
Width		10 ft.
Overall height (covered)		13 ft. 11¾ in.
Overall height (open)		6 ft. 10½ in.
Covered wagons		Steel
Open wagons		Wood
Couplers		Swivel butt Jenny Penn
Wheels		43 in.
Original tare weights:	Covered	8 tons 10 cwt.
	Open	7 tons 16 cwt.
	Goods-brakes (specially weighted)	15 tons 10 cwt.

The type was not repeated after 1910 as it was found that the wagons were too light in a train composed of 30- and 40-ton bogie wagons on our line with its many sharp curves. Instead, the 30-ton fully braked bogie wagon was adopted as standard. Since the war a new type of 45-ton bogie wagon, fully braked and with automatic couplers, has been adopted.

Yours faithfully,

I. B. TREVOR

Kowloon-Canton Railway (British Section), Kowloon

Railway Efficiency

September 18

SIR,—In your September 8 issue, Mr. Peter Collins, in dealing with the subject of railway efficiency, gives one aspect, but there is another more serious one. From your personal columns it is noticeable that almost without exception, every appointment made this year to District Officer level and their various assistants have gone to men having so-called "social background." Many years' practical experience and proved ability now count as nothing against a public school, plus a year or two as an apprentice.

These appointments are causing consternation among thinking railwaymen, whereas the appointment of knowledgeable craftsmen would be inspiring confidence and respect. It also clearly shows that very discreetly, but nevertheless firmly, the door has been bolted and barred against promotion of the rank and file to District Officer level. This subtle policy may, or may not, have its points on long term, but in the present parlous state of the railways it looks remarkably like "fiddling while Rome is burning." Small wonder that much promising material is being lost to the railways.

Yours faithfully,

W. ROSE

19, Darley Road, Manchester 16

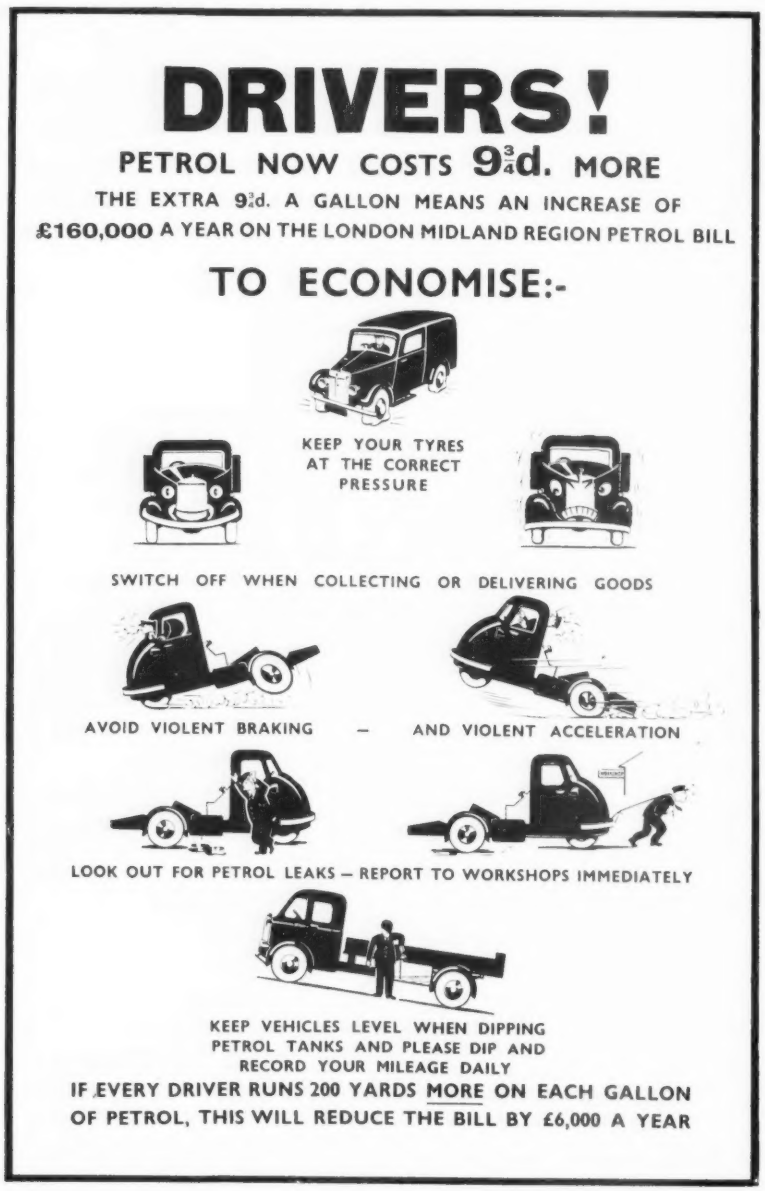
THE SCRAP HEAP

Contrasts in Railway Travel

Announcements of the arrangements for long-distance visits to the Festival next year by rail, with new all-steel coaching stock and new locomotives, suggest that visitors from distant parts of the country will get to London more rapidly and more comfortably than those who made the journey in 1851, but not more cheaply. The extreme cheapness of the final rail fares to the Exhibition then were mainly brought about by Northern acumen. The railway companies themselves had made no special arrangements for the Exhibition tourist traffic at all, and were shaken from this happy inertia, it is said, by the success of a proposal for cheap trips by sea from Hull and by some unauthorised local agent in the West Riding who began to bid for Exhibition traffic.

The return rates from the North to London fell from fifteen shillings to ten, and then to five. In the event the number of travellers was large enough to cover the loss which the directors expected from this unprecedented obeisance to public curiosity; and the era of the railway excursion was put under way.

When it came to running the trains the railway companies who really scored were those, like Euston, who had previously installed the new electric telegraph. Otherwise one simply dispatched as many trains to London as there were people to go in them. The officials at Kings Cross, lacking the telegraph, depended on the simple system of keeping a good look-out along the line to see if anything was coming. Shades of Bradshaw!—*From "The Manchester Guardian."*


DRIVERS!
PETROL NOW COSTS 9¾d. MORE
THE EXTRA 9¾d. A GALLON MEANS AN INCREASE OF
£160,000 A YEAR ON THE LONDON MIDLAND REGION PETROL BILL
TO ECONOMISE:-
KEEP YOUR TYRES AT THE CORRECT PRESSURE
SWITCH OFF WHEN COLLECTING OR DELIVERING GOODS
AVOID VIOLENT BRAKING – AND VIOLENT ACCELERATION
LOOK OUT FOR PETROL LEAKS – REPORT TO WORKSHOPS IMMEDIATELY
KEEP VEHICLES LEVEL WHEN DIPPING
PETROL TANKS AND PLEASE DIP AND
RECORD YOUR MILEAGE DAILY
IF EVERY DRIVER RUNS 200 YARDS MORE ON EACH GALLON
OF PETROL, THIS WILL REDUCE THE BILL BY £6,000 A YEAR

A reproduction of a poster produced by the Public Relations & Publicity Department of the London Midland Region, British Railways, collaborating with the Regional Road Motor Engineer, for display at goods depots and stations and in road motor workshops

"Copping" the Engines

The hobby of collecting engine numbers was originally known as "cop-lobbing." A locomotive seen for the first time was a "cop." Before giving it up after 25 years I had "copped" a total of 14,486.—*From a letter to "The Evening News."*

Roman Railwaymen

Mr. E. Lees, L.M.R. District Traffic Superintendent at Carlisle, is wanting the railwaymen of that town to apply for the job of Emperor Hadrian. He also wants over 300 other members of the staff to become Roman legionaries, ancient Britons, and druids. There are jobs, too, as Arch Druid Gwyneth, a centurion, a headsman, a girl victim, Aulus Platorius Nepos, and other leading lights of long ago, in a pageant of Carlisle to celebrate Festival of Britain week in August, 1951.

The Carlisle pageant will depict nine episodes in the history of the town, and it is episode 1—the entry of Hadrian into Carlisle and his building of the Roman Wall—which Carlisle railwaymen have undertaken to produce.—*From the London Midland Region Edition of the "British Railways Magazine."*

Tailpiece

For relaxation of the mind
Great learned tomes some chaps will choose,
Some are romantic, some refined,
On murder others will enthuse;
For those who only read the best,
Bradshaw's Guide stands every test.

A thousand journeys you may make
To let romantic fancies roam,
And such adventures undertake—
While in your armchair safe at home.
And in the contents you will see
An awful ingenuity.

By clues all mysteries unfold,
A frequent smile, an erstwhile tear,
Emotion you cannot withhold
While tracing names from there to here;
You will be guided, thrilled, and trained,
With humour, also entertained.

A. E. C.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

EAST AFRICA

North-South Link Survey

Survey work on the proposed link-up of the East African and Rhodesian Railways is proceeding reasonably well. The link-up was referred to in our issue of January 27, 1950, and discussed at length in the issues of April 1 and May 13, 1949. Four survey teams are now at work, all composed of East African Railways & Harbours staff. The Resident Engineer in charge is based at Mbeya in the Southern Highlands of Tanganyika. Each party consists of three or four surveyors, some of whom are Asians, and about 50 Africans, most of whom are clearing ground for survey lines and making approaching tracks. The season has been well chosen and weather has not hampered progress.

Most of the key points in Tanganyika, such as gaps in hill ranges and valley routes, have been settled, and the task now is to work out the general alignment linking these points. Royal Air Force Air Survey machines have rendered valuable assistance in photographing the uncharted sections of the probable route.

It is possible that the link with the Rhodesian Railways will be made at Kapiri M'poshi, near Broken Hill. An economic survey of the route to determine the economic and development possibilities has yet to be initiated. Plans of the proposed route and reports thereon are due for completion and submission by June, 1952.

CANADA

Normal Working Restored

Canadian Pacific and Canadian National Railways officials had their plans ready to put into operation at once when the nine-day nation-wide strike ended on August 31. First of all, crews had to be notified to report for duty, and required a two-hour call. Fires had to be lit in locomotives, which also had to be thoroughly inspected.

Passenger cars required fresh drinking water and thorough cleaning, and air-conditioning units had to be inspected, oiled and greased. Ice had to be placed in air-conditioning units. All running gear on cars and locomotives had to be examined and put in proper condition.

Track patrols had to be manned to ensure that the rails were in safe condition. Main tracks switches had to be checked, as had the block signals, which normally are actuated by movement of the trains. Time signals were sent to every station for the use of despatchers, and watches carried by train service employees had to be checked and compared for accuracy.

Train despatchers checked every train order that was in effect when the strike began, and renewed such of these as were necessary. They also had to dispose of all timetable schedules still in effect and arrange the necessary train order authority for trains to resume operations. Trains abandoned when the strike began had to be got moving again.

The railways kept their pledge that persons stranded by the strike and whose tickets were outdated would be given extensions for the number of days the strike lasted.

UNITED STATES

New B. & O.RR. Main-Line Tunnel

Work is now in hand on a new double-line tunnel on the Baltimore & Ohio Railroad main line five miles east of Clarksburg in West Virginia. It will replace the one built nearly 100 years ago, and will enable the gradient against westbound trains to be reduced from 1 in 100 to 1 in 330; reverse curves in both approaches will also be eliminated. The new tunnel will be 3,300 ft. long, 31 ft. wide, and 28 ft. high, and with its approaches will provide a greatly improved 2·4-mile length of new line.

An unusual feature of this new section of line is that it will be signalled for working in both directions over either track, the signals being interlocked with the centralised traffic control installed in this area. The alignment of the new tunnel is parallel to and 400 ft. distant from the old tunnel, than which it is 600 ft. longer, due to its piercing the hill at a lower level so as to secure less rise and fall as well as the easier gradient. The work, which is being done by contract under the general supervision of Mr. A. C. Clarke, Chief Engineer, B. & O.RR., is expected to be completed early in 1952. The estimated cost is about £1,430,000.

BULGARIA

Achievements and Developments

August 6 last was celebrated as "Railwaymen's Day." It was the first celebration of its kind ever held in the country, and followed the pattern of the Soviet Railwaymen's Day celebrated this year on July 30. Doctor Georgi Tchankov, the Minister for Transport, said that in 1949 the goods tonnage was more than twice, and the number of passengers more than three times, that of 1939.

In 1939 wagon turnround time averaged 204 hr.; it fell to 122 hr. in the first half of 1949, and to 103 hr. in the first six months of the current year. The weight of goods trains, he stated, increased from 555 *tonnes* for the first half of 1949 to 614 *tonnes* for the first half of this year.

Until the end of 1949 locomotive depots had to do without organised repair teams, but such teams had now been attached to eleven depots. This, in addition to saving labour and shortening the period of overhaul of the locomotives, had improved maintenance, which in turn had enabled the use of low-quality fuel (lignite) to be reduced by 25 to 35 per cent.

The efforts of two Soviet specialists had enabled certain components and spare parts formerly supplied from abroad, such as couplings, buffers, and a number of locomotive parts, to be produced in Bulgaria. Despite this all-round progress there were still shortcomings, and, although the frequency of mishaps and "catastrophes" had been reduced, 14 per cent. of the trains still failed to arrive on time.

A 25-point resolution which the railwaymen submitted to the Bulgarian Premier during the celebrations included promises to increase efficiency.

(*a*) To reduce the frequency of mishaps, breakdowns and "catastrophes."

(*b*) To fulfil the transport plan to 101 per cent.

(*c*) To reduce the turnround of the wagons to an average of 82 hr. (39 hr. in the Plovdiv district; 40 hr. in the Stara Zagora district; 46 hr. in the Stalin district—formerly Svilengrad district, on the Turkish frontier; 57 hr. in the Gorna district; 60 hr. in the Sofia district).

(*d*) To attain commercial speeds (goods trains) varying from a minimum of 14½ km. in the Sofia district to a maximum of 16 km.p.h. in the Stalin district.

(*d*) To reach an average gross weight of 642 *tonnes* for the goods trains, varying from a minimum of 560 *tonnes* in the Stalin district, to a maximum of 700 *tonnes* in the Sofia district.

(*e*) To reach a locomotive performance averaging 189 km. in the 24-hr. period (117¼ miles), varying between a minimum of 166 km. (103 miles) in the Pleven district, to a maximum of 205 km. (127¼ miles) in the Gorna Orjahovica district.

FRANCE

Lightweight Coaches for Camargue

Six light metal bogie coaches for the metre-gauge railways of the Camargue Company in the Rhone delta have been built by the Etablissements Decauville in collaboration with L'Aluminium Français. The makers consider that similar coaches may find extensive use on narrow-gauge colonial railways.

The coaches, built entirely of aluminium alloys, measure 60 ft. over buffers and hold 120 passengers (80 seated, 40 standing). The total weight is 7 tons 7 cwt., or about 138 lb. per passenger. Reduction in weight per passenger was the aim of Monsieur L'Euverte, the company's general manager, when he decided after the war to scrap old rolling stock, while retaining in use the same 320-h.p. double bogie electric locomotives.

The Camargue railways, dating from 1892, total 78 route-miles.

Fifteenth International Railway Congress

Retention of Full Wagon Load Traffic

Measures other than reduced rates to combat road competition

FROM information on the subject of the most appropriate steps (apart from reduced charges) for keeping traffic by full wagon load on the railway, received from eight important administrations and summarised by Mr. A. A. Harrison, Executive Officer (Road Transport), British Railways, it is shown that these steps can be grouped under the three heads of service; protection by statutory limitation of road competition; and integration of transport facilities through State ownership or control of rail and road undertakings. Mr. Harrison's report is concerned with traffic in full wagon loads as distinct from miscellaneous traffic which has been reported upon to the International Railway Congress in former years. The information is derived from British Railways; from the State railways of South Africa, New Zealand, India, Sudan, Egypt, and Victoria; and from the Pennsylvania Railroad.

There is divergence of practice in the provision of road transport at the end of the railway journey for traffic in full wagon loads. The most comprehensive service of this kind is provided by the railway administrations in Great Britain and South Africa. In other countries, consignees are, in the main, required to make their own arrangements for removing such traffic from the railway stations. Rail transit cannot compete successfully with road transit unless it either affords a comparable door-to-door service, or induces the trader to accept a station-to-station service only.

Goods on British Railways are grouped in 21 classes only, largely on a basis of value, loadability, and vulnerability to theft and damage. Traffic in the 10 lower classes (and class 21) is carted only by special arrangement, and rates cover station-to-station conveyance. The rates for classes 11 to 20 include collection and delivery as a normal feature. The cartage organisation covers most goods stations on British Railways and 124 of the South African stations. On British Railways the bulk of the work is done by railway-owned staff and equipment, but in South Africa this applies at 10 stations and at the remainder the work is done by contractors who are appointed after public tender on five-year contracts.

The Pennsylvania Railroad provides a cartage service for full wagon loads only for New York City; the work is undertaken by a contractor. Neither the New Zealand nor the Indian Railways undertake the cartage of full wagon loads, and the Indian Railways do not contemplate doing so. In New Zealand a system of rebates is applied at 23 of the large provincial centres where competition is keen. There is an insistent and growing demand for door-to-door delivery of goods in New Zealand, particularly those of an urgent or perishable nature, but the railway administration has entered into an understanding with the New Zealand Road Transport Alliance, whereby the railway will not undertake town delivery work, provided the road operators will not seek licences to operate route services in competition with rail. The New Zealand Railways, however, feel that the provision of their own terminal transport would reduce overall time in transit, and time is regarded as a vital factor in the diversion of traffic to the road.

In Great Britain, experience over a long period has shown the traffic-retaining value of terminal cartage. So far, the provision of the service from the largest possible number of stations has been preferred to concentrated arrangements, but the situation may change, where, as in Great Britain, the integration of rail and road transport may lead to British Road Services becoming more and more employed in extensive feeder and distributor services which would absorb local cartage. In the process, some branch lines, or intermediate stations on main or branch lines, may cease to be required, or be kept open for mineral traffic only, and worked with a minimum of staff and motive power.

Types of Vehicle Used

So far it has been more economical to employ rigid motors and motive units for articulated equipment, more or less as designed by the manufacturers for the general market, since vehicles specially designed for the peculiarities of railway cartage would lose the benefits of mass production. Containers have proved to be very useful, particularly on British Railways which have a stock of some 21,177 of them, of various types. Should the integration of transport take the form described later, the use of containers is likely to grow apace in order to reduce the cost of transferring traffic between road and rail vehicles. Wagon-carrying trailers have not found favour in any of the countries covered by this report. Rail-road trailers are useful in special circumstances, but the demountable non-wheeled container is better because it can be carried by rail and road on standard interchangeable equipment. This also avoids the waste of capital assets represented by wheels, tyres, springs, and brakes, which are idle during the rail journeys. Rail-road trailers are not used on the South African Railways, the Indian Railways, and the Pennsylvania Railroad.

Express freight movement over long distances is the best competitive weapon in the hands of the railway. It is necessary constantly to review and improve the freight schedules. A regularity of transport times is just as important as speed, and it is essential to maintain and improve the punctuality of the services. On British Railways freight train services are not divided into slow and fast with differing scales of charges, but clients wishing to obtain a faster service than that normally given by freight train have the alternative, if the traffic is suitable, of sending it by passenger train at appropriate charges. Express freight train services are provided between important centres, chiefly on main-line routes, both for streams of ordinary traffic and also for particular classes of traffic, such as seasonal fruit and vegetables. No extra charge is made for these services. In New Zealand, express freight services are provided for long-distance traffic. The longest of these is between Auckland and Wellington, a distance of 426 miles, the express service taking half the time of the ordinary through freight train service. The express services are used extensively for perishable traffic, although the bulk of the traffic so carried is of a general nature. No additional charges are raised. The Indian Railways have introduced express freight services between certain important stations for perishable traffic, at no extra charge. On the Pennsylvania Railroad freight traffic is divided into slow and fast, and the choice is left to the consignor, who pays charges accordingly.

Protection from Road Competition

In varying degrees, protection by statutory limitation of road competition has been found necessary in some countries. In Great Britain, the Transport Act, 1947, has narrowed the field of competition still further by requiring independent hauliers to obtain permits from the Road Haulage Executive to enable them to carry the generality of traffic more than 25 miles from their base. In South Africa, the operation of private road operators is governed by the provisions of the Motor Carrier Transportation Act, under which the railway administration is able to oppose any application for road conveyance which may be in competition with established rail service.

The Government of India has formulated principles according to which long-distance goods traffic has been reserved for the railways, leaving the short-distance traffic for movement by road, or rail, as clients may desire. All road transport in New Zealand must be licensed. Any interested part may object to the granting of a licence. Applications by the railway to operate road

(*Continued on page* 353)

Fifteenth International Railway Congress

Continental Marshalling Yards

Recent developments in equipment design in Belgium and Austria

IN our issue of September 29, we published a summary of the report presented to the International Railway Congress Association by Mr. J. I. Campbell and Mr. J. W. Watkins, on the modern design of marshalling yards in English-speaking and associated countries. Corresponding Continental yard developments are reported on by Monsieur J. van Rijn, Chief Engineer, Belgian National Railways, who summarises the replies of the railway administrations in Austria, Belgium, Finland, Portugal, Mozambique, and Spain, and what follows is mainly confined to some of the hump yard features in these countries which differ from those covered by the Campbell-Watkins report.

There are few double-direction yards in the six countries mentioned above, and, where traffic, site, and other conditions permit, two separate single-direction yards are considered preferable. The maximum capacity of a single-direction yard is put at 3,000 to 3,600 wagons a day at peak periods. As elsewhere, various steps are taken in all yards to prevent, as far as possible, interference between trains entering and leaving each yard, and the train engines, and shunting movements. There are generally lines running round the groups of sidings, but this may entail too great an engine-mileage for many locomotives, and in such cases more direct routes are provided by carrying them under the humps. Two access lines to the main hump are usually provided, to enable continuous shunting to be carried on, using two humping engines; such lines are also necessary where there are two humps of different heights. In Austria and Finland, instead of raising a hump in winter, the practice would appear to be to provide two humps of different heights. One reason for this is that, though they are nominally summer and winter humps, their use actually depends on climatic conditions day by day. There are no gravity yards in these countries.

Retarders and Point Control

Only the Austrian State Railways at present use mechanical wheel-brake retarders—of the Thyssen jaw type (Frölich)—and shoe type brakes made by Büssing. These retarder brakes are used only in the first braking zone of each hump yard to obtain preliminary and spacing braking. In the second zone hand skids or skates are used in all cases; in Belgium these skids are thrown clear by means of deflecting rails at a point 131 ft. away from the last switch. The shoe track brakes are each worked by one controller, but one man is responsible for two Thyssen brakes. One man is detailed to place the hand skids in each group of 2, 4, or even 6 sidings. In Austria every group of six loaded axles or ten unloaded axles must be controlled by a wagon hand brake.

The Belgian National Railways administration is, however, now installing Westinghouse brakes, Type 34, which will each be 75 ft. 5 in. long, and consist of two parts that can be worked separately and are electrically insulated.

Centralised point control is so arranged that it can be effected either by hand or by motor, and track-circuiting is used to prevent premature operation of the switches. In Austria and Belgium, where there are automatic installations, they control only the lead-in switches. In one of these installations recently brought into service, there is an electric diagrammatic device to maintain the correct order of cuts following those that have caught up the previous one. This type of equipment will also be used in projected automatically controlled switch installations, wherein the cut itself will operate the route control through the medium of track-circuiting; all switches will then be automatically controlled.

Two-way Communication

To communicate with the yard staff, the foreman generally uses bells, microphones, and loud-speakers. Two-way communication is also provided between the brakesmen and the man at the hump. Shunting foremen, pointsmen, inspectors, and shunting engine drivers are not expected to communicate with one another, as the yard foreman is responsible for all their work.

In some Belgian yards the central control office is provided with dispatching equipment, similar to a true dispatching installation, and the man in charge of the marshalling is listening-in all the time on a special (regulating) circuit, on which also are all the signal-boxes in the yard and its neighbourhood, and also the different yard foremen, foreman's depot, and the locomotive running shed. Pneumatic tubes for transmitting waybills and messages are to be found installed only in Austria, it seems; elsewhere couriers are employed.

Two-way radio communication between the yard-foreman and shunting engine drivers is in use experimentally at Schaerbeek yard, Brussels. It has, however, the serious defect that, owing to its working on a single frequency, all drivers pick up all orders and announcements, leading to possible confusion. Other installations shortly to be tried will have a different frequency for each engine.

Retention of Full Wagon Load Traffic

(*Concluded from page* 352)

services are opposed strenuously by the road haulage operators.

In Victoria, Australia, many types of operation are permitted, as of right, irrespective of whether rail services are available or not, and it is felt that the most effective way of conserving the higher grade traffic to rail would be the introduction of legislation requiring road hauliers to pay a charge for their use of public highways which would be commensurate with the cost of construction and maintenance of the roads. In Victoria, the relatively low licence and other fees are not commensurate with such costs.

As duplicated rail and road service in many countries has led to gross under-employment of the railway, the method of integration seems to offer more hope of a satisfactory solution to the problem than methods which cause still more competition and waste of assets. Railway facilities should be improved up to the level of cost which users are prepared to pay. The capacity of the railway for efficient service should be employed fully, so that those costs which do not vary with the volume of traffic are properly spread, and, to achieve this, rail and road should be used for those functions for which they are broadly the most efficient, aiming at complementary instead of competitive operations. Where the distances are relatively short, as in Great Britain, the level of rates, as between rail and road, is highly important. Up to 200 miles and more, large quantities of traffic are road hauled on main trunk routes in Great Britain, and so long as the service is available at rates, many of which are well below rail rates, no effort by the railways to improve service is likely by itself to pull the traffic back to rail. The Transport Act, 1947, requires the production of a Charges Scheme, which is bound to have its effect on the road-rail situation, but any attempt to use the scheme to divert traffic from road to rail has to reckon with the continued freedom of the trader to operate his own vehicles without limit.

Fifteenth International Railway Congress

Rail Joints and Long Welded Rails

Summary of a report based on replies received from certain railways using flat-bottom rails

MONSIEUR O. LEDUC, Ingénieur en chef, Service Technique des Installations Fixes, French National Railways, summarising replies from the Belgian, Danish, French, Netherlands, and Swiss railway administrations, and from certain French colonial and similar overseas railways, finds that flat-bottom rails are used exclusively and weigh from 92 lb. (in Switzerland) to 127 lb. (in Holland) per yd., generally on wooden sleepers with bearing plates, though metal sleepers are widely laid in Switzerland. All railways lay their sleepers close together under the joints, which in almost all cases are square and not staggered. He considers that the most promising solutions of the rail-joint problem emerging from replies of administrations lie in two types of fishplate, recalling the chevron type, but embodying improvements upon it. They are the Belgian National Railway "C" (Cesar), now being standardised, and a similar type of fishplate at present under trial in the Northern Region of the French National Railways.

The "C" plate has six bolt-holes, a length of 2 ft. 8⅝ in., and a fishing angle both top and bottom of 1 to 3. The only part of it which acts truly as a fishplate with both flanges of the rail is the middle 6 in. of its length. On each side of this middle section is an elastic arm. The outer 2 in. at each end of the plate has a heel bearing on the lower-flange fishing surface, and a 0·39-in. stop, separated from the fishplate area by a 0·039-in. gap when bolts 2 and 5 are not tightened up. When they are tightened, bringing the arms closer to the web, the heels of the plate are forced upwards on the lower fishing surfaces until the stops come into contact with the fishing surface of the head.

This is, in effect, an elastic fishplate the arms of which bend both vertically and horizontally—acting as shock absorbers—and force the middle 6 in. to take up wear as it occurs, thus preventing the joint from sagging; the ends of the rails are also considerably strengthened by the added tension of the arms reinforcing that of the bolts. The life of the joint is therefore prolonged, and defective maintenance is made good. Ten years good service is now standing to the credit of the "C" type fishplate.

Durand Fishplate

Another interesting type of elastic fishplate being tested on the French railways is the Durand type. It appears to be giving excellent results. Each plate consists of a bundle or cluster of curved spring-steel blades—on the laminated spring principle—assembled by rivets in a steel casing, which takes all the wear. In section these plates are rather like the legs of a bow-legged man, one on each side of the rail. As the normal four bolts are tightened up they force the middles of the plates inwards and their top and bottom bearing surfaces upwards and downwards, respectively, against the rail fishing surfaces, the tightening acting against the spring of the plates.

The other types of fishplate described are mainly of the standard patterns in use on the various railways. The French National Railways plate is, for instance, of the straight type except in the middle section at the joint, where it is splayed out as an angle-type plate. It also has an abnormally wide bottom bearing surface. The Algerian railways favour an elaborate form of angle plate, but for the most part the railways contacted use plain straight plates.

The ratio between the section of rail and fishplate is almost uniform on all systems, and that of the moments of inertia 0·3. The ratio of the rail and plate modulus of resistance increases with the weight of the rail; it is 0·3 for 110-lb. rails, and 0·45 when 132- to 139-lb. rails are used.

Apart from the "C" type Belgian fishplate, all those used by the railways who replied are of the four-hole type; the diameters of the holes are from 20 to 25 per cent. of the total height of the rails. There is a tendency in France and Belgium to use smaller bolts and holes to reduce the risk of cracks in the rail, which usually start at the bolt-holes. In these two countries also trials have been or are being made with the heat-treating of rail-ends so as to give the metal physical and mechanical characteristics that will enable it to resist abnormal stresses. In Belgium the ends of all new rails laid on main lines since 1935 have been so treated.

In general, simplicity seems to be the aim of the designers of up-to-date fishplates; complicated types are now ruled out by maintenance difficulties. Flanged plates have been discarded as tending to warp the coachscrews, an objection which does not apply to the short central flange of the French standard plate or to the Algerian type, which is very short, and is situated entirely inside the fastenings of the joint sleepers.

Existing standard rails received from the rolling mills for service on the various railways vary in length from 39 ft. to 118 ft., but joint-gap considerations have decided the French railway authorities to abandon 79-ft. rails in favour of 60-ft. Long welded rails over about 100 ft. in length are used by the Belgian National, Danish State, Algerian, Netherlands and Swiss Federal Railways for main lines carrying fast, heavy traffic. Some administrations favour long rails in stations and sidings also, and 820-ft. lengths have been welded in France. Long rails from 600 ft. to 800 ft. are common practice on bridges, and in tunnels they are considerably longer; a length of 11,220 ft. (roughly two miles) has been welded in Switzerland.

Normal fastenings are used in all cases, and various types of anti-creep device are common practice. The number of sleepers depends on the importance of the lines and not on the lengths of the rails. Closer sleeper spacing is not used under welded joints. Only in Algeria is serious creep reported with long welded rails.

Expansion Gaps

All railways consulted use the formula: Joint gap = coefficient of expansion × length of rail × variation in temperature for all rails under about 80 ft. in length, in order to assess the width of gap. Extreme temperature variations vary considerably between the minimum corresponding to the maximum gap allowed and the maximum corresponding to the completely closed gap. On this basis some railways, by decreasing this variation, are able to decrease the gap at the risk of setting up stresses in the track when the temperature of the rail exceeds that at which the gap closes up. To avoid excessive impact when the wheels pass over the gap, the width of gap is not allowed to exceed 15 mm. (0·6 in.) on any railway, and on one system it is limited to a fraction over ¼ in. For free expansion under wide temperature variations, therefore, rail lengths are limited to about 65 ft.

For longer lengths of rail, stresses must be allowed to develop in the rail, as a result of the joints closing at relatively low temperatures, provided that they are not sufficiently great, when taken in conjunction with the characteristics of the track, to lead to buckling. Alternatively, there may be no free expansion, when stresses will develop before the joints close up, expansion being resisted by the fishplating or friction in the fastenings and parts of the track.

At any rate, no drawbacks or inconvenience are reported by any administration adopting this practice, and it therefore seems feasible to use rails up to nearly 200 ft. in length joined by normal fishplates and with joints up to 0·63 in. or 0·70 in. wide, which may be expected to give satisfactory results. On the other hand, if rail lengths are limited to about 80 ft., the width of gap can be correspondingly reduced.

Fifteenth International Railway Congress

Transmission and Wear of Track in Electric Locomotives and Motor Coaches

Experience on the Continent with nose suspension and flexible transmission systems

THE report to the International Railway Congress in Rome by Monsieur J. Tapia, Chief Electric Traction Engineer of the Spanish National Railways, covers practice in Italy, Portugal, and Spain. This question has as its terms of reference the comparison of the different types of transmission between motors and axles of electric locomotives, electric motor coaches and diesel-electric railcars; and the effect on the track of the types of bogies and systems of motor suspension.

Practice on Italian Railways

On the Italian State Railways in 1949 nose-suspended motors were in use on 414 electric mixed traffic locomotives and 28 motor coaches. The two types of spring drive were divided as follows:—

	Bianchi	Negri
Mixed traffic locomotives		205
Passenger locomotives ...	210	37
Motor coaches	152	30

With the nose-suspended motors the gearwheel centre is secured to the hub of the driving wheel so that part of the driving force is transmitted direct to the wheel and the remainder by the torsion of the axle. The nose is supported from a cross stay by two coil springs.

Two types of the Bianchi drive are used, one for locomotives in which each axle is driven by twin motors, and the other for motor coaches, in which each motor drives its axle through double-reduction gearing. The Negri drive is somewhat similar to the Bianchi, both systems employing laminated springs. The use of a Negri drive with coil springs was discontinued in 1945 owing to repair costs arising from the wear of certain parts.

Occasional breakages of spring plates are experienced with the Bianchi and Negri drives, and the cost of repairs to these mechanisms is estimated as 10 per cent. of total running repair costs. For nose-suspended motors the cost of repairs is negligible.

The permanent way department of the Italian State Railways expresses a preference for fully-suspended motors because of reduced loads on track and bridges.

A third system of motor suspension has been adopted on certain motor coaches. This is known as rod suspension, the motors being suspended from the bogie frame at their centre of gravity by vertical rods, and driving the axles through resilient gearwheels. Excellent results are reported with this type of bogie at speeds up to 87 m.p.h., and the cost of repairs has been much reduced.

Information received from the Nord Milano Railway shows that of the six locomotives and 25 motor coaches in service, all but three have nose-suspended motors. The exceptions are three motor coaches with quill drive. Normal maximum speeds are 53 m.p.h. for the locomotives and 62 m.p.h. for the motor coaches.

Nose-suspended motors are most widely used on the Spanish National Railways at present, but there is a fair number of locomotives with flexible drive of the Brown-Boveri Buchli or Winterthur types. The distribution of these systems among the various electric-motive power units in 1949 was as follows:—

	Nose-suspension	Brown Boveri Buchli	Winterthur
Mixed traffic locomotives	83	—	—
Passenger locomotives	—	24	1
Motor coaches ...	92	—	—

The Brown-Boveri Buchli transmission is used on two 2-Co + Co-2 classes designed for a maximum speed of 68 m.p.h. Each axle is driven by a motor with a resilient pinion at both ends of the shaft, and the two large gearwheels, on the inner side of the driving wheels, revolve on a quill which is rigidly attached to the motor.

It is mentioned in the report that nose-suspended motors with rigid pinions and gearwheels have been adopted in the 3,000-h.p. Co + Co locomotives recently delivered, which have a maximum speed of 62 m.p.h. On the other hand, the 20 Co + Co locomotives of 3,150 h.p. (maximum speed 78 m.p.h.) now on order will have the Alsthom flexible drive. A preference for some type of flexible transmission in vehicles running at high speeds is expressed by the permanent way department.

According to the locomotive department, nose-suspension is suitable for locomotives at speeds up to 50 m.p.h. and for motor coaches at speeds up to 62 m.p.h. More insulation failures have been experienced with nose-suspended motors than with fully-suspended types, which suggest harmful vibration effects when nose-suspension is used in conjunction with rigid pinions and gearwheels. Trouble has arisen with the resilient pinions in the Buchli type of drive due to faulty lubrication or failure of the springs to act properly. This has led to broken gearwheels because of intermittent stresses, and the situation is complicated by the possible uneven distribution of forces between the two pinions of the double-ended drive. Track maintenance and the condition of the vehicle springing are considered to have much influence on the behaviour of the Buchli drive, maintenance of which is a delicate task. Methods of reducing the failures described are being studied by the maker of this transmission.

The Italian State Railways have 65 diesel-electric shunting locomotives in service that were taken over from the U.S. Army. No details of their performance are given in the report. On the Portuguese Railways 12 diesel-electric locomotives of 1,500 h.p. and 12 diesel-electric shunters of 380 h.p., built respectively by the American Locomotive Company and by General Electric, have been in service for a year. Results have been good, although methods of correcting excessive transverse oscillation of the locomotives are under investigation.

Seven diesel-electric railcars of 400 h.p. and three of 300 h.p. are in service on the Spanish National Railways. In these vehicles only one bogie is motored, and the motors are nose-suspended. They have been in service since 1935, and are satisfactory up to 68 m.p.h.

Bogie Design

Comprehensive details of types of bogies used on the Italian State Railways and the Spanish National Railways are given in the report. Summarising his conclusions on bogie design, the reporter refers to the successful results obtained in recent years at high speeds with locomotives having no non-motored guiding axles. In three-axle motor bogies it is recommended that the centre axle should have side play to avoid harmful forces being set up in the bogie frame by the tyre bearing on the rail. This play would ensure the thrust of wheel on rail being similar to the conditions in a two-axle bogie. It is considered desirable to employ a transverse coup'ing between bogies.

For high-powered and high-speed Co-Co locomotives a central position is favoured for the bogie pivot, since a position between the first and second axles results in excessive guiding effort from the leading axle. The spacing between pivots should be as wide as possible, buffing and drawgear being carried on the main frames of the locomotive. A recommended form of connection between bogie and body is a pendulum self-centring arrangement such as that fitted to the Alsthom Co-Co high-speed locomotive of the S.N.C.F. The reporter also speaks favourably of the method of attaching the axleboxes to the bogie frames with hinged rods mounted on Silentblocs as used in that locomotive; and of the attachment with Silentblocs in the Swiss Re 4/4 locomotives. The centre of gravity of bogies and body should be as high as possible within certain limits.

Fifteenth International Railway Congress

Continental Rail Joint Practice

Improvements in fishplate joints and the use of long welded rails in Italy and other European countries

IN a report upon answers to Question II before the International Railway Congress, Signor B. Renda, Chief Permanent Way Inspector, Italian State Railways, summarises the replies from railways in Italy, Portugal, and colonies, Sweden, and certain other, mainly Central and Eastern European systems. All the railways concerned are laid with flat-bottom rails, mostly weighing from 99 to 110 lb. per yd. Most of them support the rail-joints on twin wooden sleepers bolted together, though in Portugal they are spaced about 1 ft. 7 in. apart, and one Austrian pattern is in steel. In all cases the joints are square and not staggered, but a recent trial of staggered joints in Italy is reported to have given very satisfactory results, both in the running at the highest speeds and in respect of defects in alignment.

The Italian, Austrian and Swedish State railways use a simple flat fishplate, but the Swedish secondary lines' plate is flanged. The Portuguese administration favours an unusual joint having an L-shape fishplate on the inside and a channel type plate on the outside of the rail. In addition, there is a vertical steel plate on the outside integral with the bearing plate, through which the fishbolts pass; a wooden packing fitting into the hollow of the channel fishplate bears against the vertical plate, forming a cushion against which the bolts are tightened to secure the rails to the vertical plate.

The use of double bearing plates with a thin wooden packing between them or between the plate or plates and the foot of the rail is common, and some bearing plates have holes in the middle. Bolt diameters vary between $\frac{7}{8}$ in. and 1 in., and the use of spring washers to secure the nuts is general. There is no uniformity in the position of the nuts, inside or outside the rail and joint.

Only in Italy are fishplates normalised by heat treatment, and there it has proved effective in preventing breakages at the bolt holes. Tensile and bending tests as a check on fishplate strength are also made in that country. Checking and greasing of fishplates are carried out every three to five years in Italy, Austria and Sweden. Fishing wear is made good by the insertion of packings, but in Austria worn plates are also reforged. Cracked plates are repaired by welding. Only the Austrian and Swedish administrations reuse all fishplates worn down in height after hot stamping; others scrap them. Breakages of fishplates on all lines are rare, but on Italian lines the percentage is about 0·5. The types of insulated fishplates used resemble those in other countries.

Longer than standard long welded lengths are commonly used provided that special expansion devices are installed. On the Portuguese railways bearing- or sole-plates are provided only under rail joints, and in Sweden there are direct fastenings with soleplates secured with elastic clips or coach screws. Ribbed soleplates with indirect fastenings, and even keyed chairs are to be found in Austria. Italian railways also lay their rails on soleplates with indirect fastenings.

Anti-Creep Devices

Most railways appear to use anti-creep devices in some circumstances and in some form. Sleepers under site-welded joints are similarly spaced to those under suspended normal fishplated joints. No special spacing is made under shop-welds. Broken stone ballast is generally laid, but gravel is also to be found in Austria and Sweden. Joints at the ends of long welded rails are like those in normal track. Except on Swedish railways, rail-lengths of over 197 ft. on bridges are fitted with special expansion devices, usually consisting of tongue- and stock-rails; they can be arranged to allow for expansions from 4 in. to 16 in. No special devices are to be found for anchoring the track in the open to the bed.

Widespread opinion considers that very long welded rails in the open should be laid at temperatures between 41° F. and 86° F. as a rigid maximum, as the joints are completely closed up at the latter temperature. In tunnels, it is agreed, the rails should be laid with their ends in contact or with a gap of not more than $\frac{3}{64}$ in., though in Italy those near the portals have the same gaps as in the open.

It has been found generally that, provided fastenings and anti-creep devices are efficient and sufficient, no abnormal creep is experienced, nor have any railways, except in Sweden, encountered any track deformation, either vertical or transverse, in long welded rail sections if adequately ballasted and packed. In very hot weather, however, neglect to take these precautions has resulted in deformation on occasion in Italy.

On the Italian State Railways, two separate 236-ft. lengths of continuous welded 100-lb. rail, each carried on 120 sleepers, were reinforced throughout their middle sections by the laying of three rows of sleeper stringers under the 50 central sleepers. One row was under each end, and the third under the centre of these sleepers; the joints at the ends of the lengths were of the standard angle-fishplate type. These stringers were in the road for four years, during which time no defects in it were observed. The joint gaps were completely closed at a temperature of 97° F., and at 14° F. the joint gaps measured $\frac{11}{16}$ in.

Also on a Swedish secondary line a 3,498-ft. length of welded rails was laid in 1935, the normal fastenings, including standard soleplates, wooden packings, and coach screws, and also 24 pairs of anti-creep anchors being used. The track was ballasted almost up to rail level, and on curves lateral displacement was resisted with the aid of 1-in. rail pieces set in the road-bed at four-sleeper intervals in contact with the rails. The track has been inspected every two years and sleepers replaced every five years, when also exposed metal surfaces were repainted with anti-rust varnish. The road has thus been made to stand up to severe frost, and no trouble has been experienced due to varying temperatures.

The general opinion of administrations is that long lengths of welded rail in the open cause no serious difficulties likely to compromise the safety of traffic by upsetting the stability of the track, so long as there is perfect adhesion between rails and sleepers completely covered with broken stone ballast, and provided that the road is carefully maintained. Some railways have, however, experienced difficulties in handling and maintaining such track. The report therefore recommends that, in the open, a moderate length of welded rail should not be exceeded, so that normal joints can still be used at longer intervals, without any exceptional maintenance measures being necessary. The length should be about 170 ft. In tunnels and even on bridges there is ample field for a longer standard length.

Expansion Gaps

Practice in regard to expansion gaps varies widely, because the different administrations use various bases for calculation, and some do not make it clear whether the temperatures they quote are those of the rails or of the atmosphere. The Austrian, Italian and Swedish State railways all use rail thermometers. The Italian type is contained in a case, which is applied to the head of the rail by means of a magnet for 10 min.; the thermometer and reading are not therefore affected by the sun's rays. In no case is the free expansion of rails considered, and the theory of limited expansion is the basis for calculations. In Italy they gave a value of 6 kg./cm. of rail to frictional resistance between the sleeper and the ballast, and allowed for a possible maximum longitudinal compression of

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Fifteenth International Railway Congress

Railway Safety and Signal Installations

Summary of a report on variations in practice in European systems

THE report prepared by Signor R. Righi, Chief Inspector, Engineering Department, Italian State Railways, is based on replies received from some eight managements, two of which, the Italian and Swedish State Railways, make much use of power signalling, especially the former, which has done so for very many years, using the old hydraulic system and later the all-electric. The tendency seems to be to have recourse to speed signalling and to relegate route indications to a secondary position, although in Italy the latter still plays a large part; elsewhere also in large stations some indication of the route to be taken is judged necessary. In Sweden, for instance, complete route signalling is held to be advantageous, as it enables a driver to check, as he approaches a layout that the route laid down for him in the service time book has in fact been set up and no mistake been made by the signalman or station supervisor. In Sweden also a very large use is made of the green-light to convey these different aspects and messages, and yellow is only seen in one case, where at the distant signal in rear of a junction it is desired to indicate that the signal in advance has been cleared for a diverging route. A few lines, however, have definitely abandoned all route indications. The general preference seems to be for the multi-aspect type of signal but the searchlight-pattern has its advocates and is sometimes used in conjunction with the multi-aspect to enable a particular aspect to be shown with the minimum of difficulty and amount of equipment.

Light Signalling

Light signalling is being increasingly used everywhere in place of semaphores, but the latter will remain in use for many years yet on certain railways. The majority of lines favour the single filament lamp, considering that the same causes whether electrical or mechanical, can injure both filaments at once and therefore when one fails, total failure of the lamp can very soon follow. The amount of proving apparatus varies with the different railways. On the Italian railways both the internal spectacle and the lamp filament are proved in searchlight signals.

Most lines intend to use light signalling in future on electrified lines. There is, however, a difference of opinion about the advisability of fixing the signals to the overhead traction wire standards. Some administrations consider that maintenance is made much easier when separate posts are provided, while the signals are then less liable to be damaged from vibration as the trains pass.

As a rule reliance is placed on careful spectroscopic tests to eliminate confusion between red and yellow lights, but in some cases this is more definitely avoided by never showing a yellow one singly at any time. The Swedish Railways are the only ones in the countries covered by Signor Righi's report to use special signals for wrong line movements as a regular practice.

Flashing lights have long been used in Sweden in distant signals and other countries, among them Italy, are now using them to obtain additional indications, as when braking distance beyond the signal in advance is insufficient as some special speed indication has to be displayed.

Relay Interlocking Panels

As to the important question of the lever type power frame versus relay interlocking panels, the tendency is towards adoption of push-button apparatus. The operating advantages of the panel system are generally recognised, although it is admitted that the added complication of the circuits brings its own problems. It is possible to place the relays at a distance from the operating panel and this in some cases is an advantage. There are differences of opinion on the advantages of placing the push-buttons on the track diagram itself or mounting them separately, which depends much on the size of the layout. There is no difficulty with the geographical arrangement in the case of small panels, but in large installations it becomes impossible to place the buttons in this manner, especially with certain systems of working, and the separate arrangement is then resorted to. In these cases also the signalmen, for operating reasons, must be well acquainted with the layout and the various routes it contains. With well-trained staff there is thus no difficulty in working with a separate desk.

Signor Righi concludes that although these so-called "entrance and exit" systems, which use a relatively small number of buttons, admit of automatic selection of alternative routes, it is doubtful whether this is of real advantage in practice, for several reasons. As this arrangement gives rise to much complication in the circuits, it is not always beneficial. Every additional complication increases the risk of failure and makes it more difficult to locate faults, and also hinders maintenance.

The report describes a panel system designed by Dr. G. Arias. Its principal features are the dividing up of the routes and the use of multi-position handles selecting both the route and the direction of travel over it. It is claimed that the panel itself is much simplified by these arrangements.

As regards remote control, out of the railways considered in the report, only the Swedish use it; an extension of it in Sweden is being investigated. The Italian lines, however, had such equipment in view before the war.

Coded Track Circuits

In the case of coded track circuits the Italian railways are the only ones intending to instal them in work now in hand, although other lines are considering doing so. The details of the track circuiting used on the lines covered by the report vary considerably, according to locality, and both d.c. and a.c. equipment is employed successfully. Most lines permit the permissive passing of a signal which remains at "stop" for a prescribed length of time under special precautions. Signor Righi discusses the problems that arise with coded track circuits in the event of a breakdown of the insulated rail joints and the means that can be adopted to reduce the risk of any wrong side signal failure occurring as a result of such breakdown.

Speed versus Route Signalling

A digest by Mr. E. J. F. Derijckere, Chief Electrical and Signal Engineer, Belgian National Railways, of replies received from Belgian, Danish, French, Netherlands, Norwegian, Swiss, and other railways, reveals much divergence of practice in the solution of the problem of speed *versus* route signalling. In Holland, for instance, it is thought sufficient to indicate speed only at junctions. On other lines, some route indication is given, either through the ordinary signal aspects or by means of some supplementary apparatus. The Belgian National Railways have adopted the position-light junction indicator, which originated in England, with a slight modification in the method of using it. On the Swiss Federal Railways junction aspects distinguish between routes formed of the older or ordinary types of points and those where special large radius points are applied. These enable much higher speeds to be maintained over the diverging route.

The new Netherlands signal system makes use of a set of speed signal aspects designed specially to meet local conditions. The form this takes is the reason for the preference shown for the "searchlight" pattern of signal, whereas in the other countries covered by the report the multi-aspect type is favoured. Most lines administrations provide some means of obtaining a "close-up" indication.

In repeating and proving the tendency is to use no proving between signals in automatic territory but repetition of signals worked or controlled from a signal box is provided as a rule. This is found also, with proving, where manual block apparatus is still in operation. This indicates a growing tendency to place much more confidence in the regular working of relays than formerly.

Limited Use of Flashing Lights

A limited use of flashing lights is met with, occasionally for running signals and in some countries for special shunt indications only. Two railways only have adopted a definite rule by which it is impossible for a driver to confuse red and yellow. Under this a yellow light is never seen singly and a red light always is so seen. Other lines rely on the technical specifications that govern the characteristics of the glasses, with standard light and dark limits. Some managements intend to use light signals systematically from the beginning in any new electrification, and as automatic signalling is generally adopted by some others when electrifying the use of light signals follows there as a matter of course.

Regarding the preference to be given to interlocked lever frames, those lines continuing to use mechanical locking consider that it offer safeguards when for any reason certain electrical apparatus is out of service, but the growing use of the plug-in type of relay has somewhat modified this attitude. Signal boxes with non-locked levers enable the operating portion to be reduced in size, and larger areas to be brought under one man's control, while automatic cancelling of routes and storage of selections can be arranged for. Some of the railways make considerable use of signal selection to reduce the number of levers or handles required in frames. Some managements prefer to place the buttons on a separate desk with the free button system, but trials with buttons arranged on the track diagram are being made. Elimination of locking devices from levers is considered an advantage in France, and the tendency is towards using panel apparatus.

From experience so far gained it seems that the first cost of the free buttons system is about 10 per cent. less than with the old route-lever type frames.

The French and Belgian National Railways express a very definite preference for the all-electric system, considering it to have higher working efficiency. In all cases of power working constant detection is used and inserted in the signal control circuits.

On the South Eastern Region (former P.L.M.) main line of the French National Railways between Dijon and Blaisy-Bas and Les Laumes and St. Florentin, nearly 70 miles, route setting control is in operation, to obtain concentrated control over traffic movements, reduce the number of staff required and, by making the two tracks available for traffic in either direction, do away with the need for quadrupling, the last impracticable, at this particular point. No difficulty was met with in training staff to work this equipment.

Only in France of the countries considered by Mr. Derijckere are there any track circuits of the coded type, some 60 in all. Their chief advantages are held to be the better shunt values obtainable on long sections and freedom from dangerous extraneous interference, with ease of application of cab signalling. It is not expected, however, that such equipment will result in any economies. The coded system is slightly superior to the ordinary track circuit from the safety point of view but it is not quite so free from failures. The coded circuits used by the French National Railways employ frequencies of 75 and 180 impulses per minute, and as a safeguard the polarity of adjacent sections is reversed.

Various types of insulated joint are met with, some made entirely of wood. The gradual adoption of longer rails makes it probable that the insulated joint problem will become more complicated and call for new solutions.

Signal Failures

As regards the number of signal failures, those lines which keep definite records report about 0·5 to 0·6 per annum, a remarkable result. The Paris Transport Board, however, gives the very low figure of 0·05, half of which is due to the components of the track circuits; each signal is operated about 120,000 times per year. The number of "wrong side" failures, adversely affecting safety is negligible.

Continental Rail Joint Practice

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about 50 tons for each rail under maximum observed summer temperature.

The rails are usually laid at a temperature of about 86° F., which insures their going into service without internal stress: in the cool of the following morning fastenings are loosened and the rails moved longitudinally to adjust joint gaps if this is necessary. On the Italian railways extensive experiments were made to determine the 6 kg. figure mentioned above. Temperature observations were taken throughout a 24-hr. period and repeated several times before arriving at an average value sufficiently close to actual conditions.

There is difference of opinion as to the value of rigid tolerances allowed for joint gaps, as creep so often makes the checking of individual gaps valueless. Preference is therefore given to the system of checking the collective values of the gaps over a section by those who do not believe in individual checks. In any case, the average or collective gap tolerance can be counterbalanced by the margin of safety between the stress in the track when laid and that required for buckling. An annual check before the hot weather is usually carried out from a fixed point and the rails pulled back as required to restore the correct gaps.

Reconstruction in Greece

Train crossing new Asopos Bridge on Athens-Salonika line. Abandoned bridge and tunnel on right

Fifteenth International Railway Congress

Track Maintenance on Secondary Lines

The views of British and some overseas railways on organisation of staff, methods, and equipment, and the results achieved

A REPORT compiled by Mr. J. R. Farquharson, Chief Engineer, East African Railways & Harbours, summarises the replies received from railway administrations, to whom Question XIII to the International Railway Congress Association was addressed. The report deals with the maintenance of secondary lines, namely branch or less important sections of heavy-traffic railway systems.

All the administrations replying employ small section gangs as their base maintenance forces, but in the more developed countries some larger sections are maintained by larger gangs, a policy also tried experimentally elsewhere. Only the South African Railways have been able to reduce the total number of gangmen employed by increasing the size of gangs for larger sections, which are, however, less intensively maintained. Generally, as might be expected, the railways in developed countries are able to maintain the track with fewer men. The principal factors determining the number of men required per mile are density and speed of traffic, axle-loads, type, strength and condition of track, the nature and quantity of ballast, the amount and severity of curvature, the nature of the formation, and climate.

The average maintenance gang consists of a ganger or gang-foreman and from four to ten trackmen, but the strength may be from two and up to 15 men. The ganger is responsible for all track maintenance and the railway reserve on his section, and for the safety of his men. There is not, as a rule, any seasonal increase in the section gangs, except on the Pennsylvania Railroad, but temporary additional gangs are employed for such jobs as re-sleepering, pulling back, and realigning curves. Quarters are provided by the railway for its staff only in the more thinly-populated areas. Men living some distance from the gang headquarters have to find their own way to work, generally either on foot or by cycle or public conveyance.

Where conditions are suitable, petrol motor trolleys are used over longer distances to transport staff, but in suburban areas they go by train to the nearest station or halt. Some railways use track tri- or quadri-cycles for carrying one to four men, or manual "pump-trolleys" carrying up to eleven; but most use push-trolleys for shorter distances, and walking to the site of the work in hand is also general. Motor trolleys usually have to obtain line occupation and their speeds tend to impair effective patrol work. On the other hand, manually-worked trolleys can be "cut" or removed from the track at short notice, and also have other advantages. Portable or fixed telephones are provided for lengthmen by some railways, and in America wireless sets are sometimes provided for gangs. Only in Victoria and the Sudan are bonuses paid at present for higher output by gangmen or for specially good general work; they are, however, being considered elsewhere.

General Maintenance Methods

On the whole there has been no great change of recent years in maintenance methods generally, but on the Pennsylvania and British Railways specialised mechanised gangs are employed for such big jobs as relaying and ballast cleaning. The periods between general or complete overhaul vary considerably in different countries. The programme is generally to: (1) clean ballast, (2) relay, (3) lift track and respace sleepers, and (4) supply additional ballast as required, on the Pennsylvania, British, and Victorian railways, mechanisation being most widely used on the first of these systems. On other lines such revisional work entails opening out the track, screening the ballast, squaring and respacing the sleepers, tightening the sleeper-fastenings, aligning the track, packing, oiling or greasing the fishplates, adjusting for creep, boxing, correcting the cess, and clearing the side-drains. Relaying with pre-assembled track is practised only on the British Railways and in the following manner:

All new materials required for, say, three-quarters of a mile of track are sent to the nearest pre-assembly dépot, and there fabricated into complete 60-ft. or 45-ft. lengths of track, which are then loaded in tiers on special rail wagons, five lengths on each wagon. On the following Sunday, these and a number of empty wagons are run out to site, where a special rail-laying crane, standing on the adjacent track, first lifts out complete sections of the old track and places them on the empty wagons. The sleeper beds are then broken up, and the ground is levelled preparatory to the new lengths being lifted from the wagons by the crane and placed in position in the track. Part-lifting then completes the day's work. Complete possession of one line is necessary, and either complete or long-period between-trains' occupation of the other is required on the Sunday; no subsequent occupations are, however, necessary for loading the recoverable materials.

Turning to the actual maintenance of track, the report shows that most railways correct fishplate wear by fitting reformed oversize cambered plates in preference to using shims, which are less satisfactory; they are, however, still used. The regular practice of welding joints *in situ* is not favoured by any administration, though it has been done experimentally. Almost all railways build up worn frogs by electric or oxy-acetylene welding, but such welding is used only on the Pennsylvania, Victorian, and South African railways for building up rail-ends. Cropping battered rail-ends is practised on the first of these systems, and their flame-hardening by the Victorian administration is reported as satisfactory.

When coach-screws or dog-spikes become loose in wooden sleepers, the holes are generally plugged and new ones bored. The double-shouldered steel bearing-plate, having a life comparable with that of the rail, is the most popular type; bearing-plates are not reconditioned. On tight-traffic lines laid with hardwood sleepers, however, the rails are usually laid directly on the sleepers, though in some cases this practice is confined to straight track. The most common method of strengthening the ends of wooden sleepers is to drive S or C clamps into them, but binding with wire or steel strips is preferred by some administrations. None of these expedients nor dowelling appears, however, to be completely justified by experience. The usual method of combatting spread of gauge on curves is to provide additional coach-screws or dog-spikes.

Damaged steel sleepers are generally re-pressed, provided that the rail-seat and lugs are still in good order, but repairs to the seat and lugs of worn sleepers are effected by welding and re-pressing on the Nizam's State Railway. When the lugs are split, the East African Railways press the lugged sleepers and re-form them as slotted sleepers. Concrete sleepers have so far only been tried experimentally, and no repairs except the replacement of fittings are being undertaken.

Level and Curvature

Tamping with beaters is still the most common means of packing sleepers, but measured shovel packing is common practice on the British and South African systems, and enables the track to stand up longer without attention. The Pennsylvania, British, and Victorian gangmen are now using mechanical tampers for stone ballast to save labour and improve compaction; they are specially useful at crossings where there is limited space between the timbers.

All railways use the string-lining system for checking curvature, and the correct alignment is usually maintained by measurement from permanent "beacons." The East African engineers use a track-recording machine, which passes over each section of line at regular intervals, and is referred to below. The small-scale record of versines readily shows where improvements are necessary.

Practically every administration replying cleans ballast manually with hand forks and screens, though British Railways use mechanical riddles instead of screens to a limited extent. The whole job is done mechanically on the Pennsylvania system with ballast- and crib-cleaning equipment. For weed-killing, solutions of either (*a*) sodium chlorate and calcium chloride, or (*b*) calcium chlorate are extensively used. They are sprayed from a train or trolley or by hand before seeding-time, and sometimes later in the year also. The Pennsylvania maintenance force also uses a weed-burner, and British Railways a mechanical weeder for cleaning the cess. Where fencing is secure against cattle-trespass, and in places well away from water courses and station yards, toxic sodium arsenite is used for weed-killing on the Victorian Railways.

Maintenance programmes are generally controlled through the budget and, within its limitations, track supervisors prepare detailed programmes for the approval of the Engineer. He maintains a record of the works carried out and the expenditure on them. Recording equipment is run over practically all lines at intervals and the results are examined so as to insure that all recorded defects can be rectified.

Rail Wear Tolerance

Practice regarding the permitted wear of rails varies widely, both as regards the amount of wear and the basis on which it is measured. Some railways consider percentage loss of weight, others reduction in depth and width of rail or width of head only; even on the same railway differences in standard are set according to the importance of the line and the material available for replacement. There is no specific standard for reduction in a minimum depth of sleepers, but some administrations rule that a sleeper reduced by 1 in. in thickness by rail-cutting should be transferred to a siding. Gauge tolerances also vary considerably. Wide gauge to the extent of from $\frac{3}{16}$ in. to $\frac{1}{2}$ in. is permitted on straight track, but tight gauge is not generally allowed, though on a few systems up to $\frac{1}{2}$ in. is permitted. All administrations allow widening of gauge on curves up to a maximum of $\frac{1}{4}$ in.

Hand tools are still largely used for rail maintenance, and especially braces, saws and drills. In the more advanced countries, however, petrol, electric, and pneumatic drills are used; power-drilling enables the labour to be halved. Petrol-driven saws make a more accurate cut, but the amount of time saved varies on different railways. By substituting screw-worked manual creep-pullers for hand bars, a saving of 50 per cent. in the labour required is effected. Only the Pennsylvania and Victorian Railways are power-wrenches to tighten bolts; they are worked by petrol and compressed air respectively. On the former system each requires three men to operate it, but the output per man is stated to be increased by 500 per cent. The Pennsylvania Railroad has a petrol-driven borer that requires only one man to work it and drills a spike-hole in 4 sec. The type in use on British Railways is handled by two men. The Victorian administration has a compressed-air type of equipment for driving and removing coach-screws, and on the Pennsylvania lines powerdriven spike-hammers and pullers are in general use. Both the two last-named railways favour the power-worked adzing-machine, but on British Railways all adzing is done in shops.

The usual implement for lifting the track is the hand-worked jack of either the ratchet or screw type. The Pennsylvania Railroad, however, uses a petrol-driven jack in connection with the mechanical tamping machine. The power-jack requires three men to work it, but in a normal lift it replaces about three men. Various types of tamping machine are at work on Pennsylvania lines, and the Matisa tamper is under trial on British and Victorian Railways for plain trackwork. Also, the electric Kango E and the Barco petrol tampers have been found suitable for crossing work in the United Kingdom.

In connection with measured shovel packing, which is done by hand, the Abtus manual equipment is used. The Pennsylvania Railroad reports the use of electrically-operated tamping machines as being particularly useful with gravel or cinder ballast. The East African Railways alone are using a versine recording machine developed by one of their engineers, Mr. R. C. Gowthorpe. In addition to measuring and recording versines, it records the cross-levels and running-top of the track.

This recorder was originally fitted to an articulated locomotive, but is now built into a special articulated bogie vehicle, in which the operator and his assistants travel. The distance between the outer of the three bogies of this vehicle is 40 ft. 7 in., and the track recorded by the versine pen is a continuous series of versines on a chord of that length, the scale being approximately $\frac{5}{64}$ in. per degree of curvature. (A one-degree curve has a radius of 5,730 ft.) Due to the tolerance between the wheel-flanges and the gauge-face of the rails, this machine cannot give absolutely accurate results, but they are sufficiently correct to show up faults and enable them to be rectified and standards of track maintenance to be established.

For cleaning ballast British Railways have replaced screens by the Abtus petrol-driven ballast riddle. On the Pennsylvania system large mechanical ballast-cleaners are standardised. For the shoulders and "six-foot" ballast the Mole and Brownhoist types of machine are principally used. The Mole is an on-track machine which digs the ballast, shakes it, disposes of the dirt and replaces the clean ballast. The Brownhoist is of the on-track type and removes the ballast with an endless-belt bucket conveyor, shakes it, returns the clean ballast, and either loads the dirt into wagons or disposes of it off the formation. Another type of machine pulls out the dirty ballast from between the sleepers and places it for treatment by the Mole or Brownhoist cleaner. All the railways are investigating the possibilities of mechanising some of these processes.

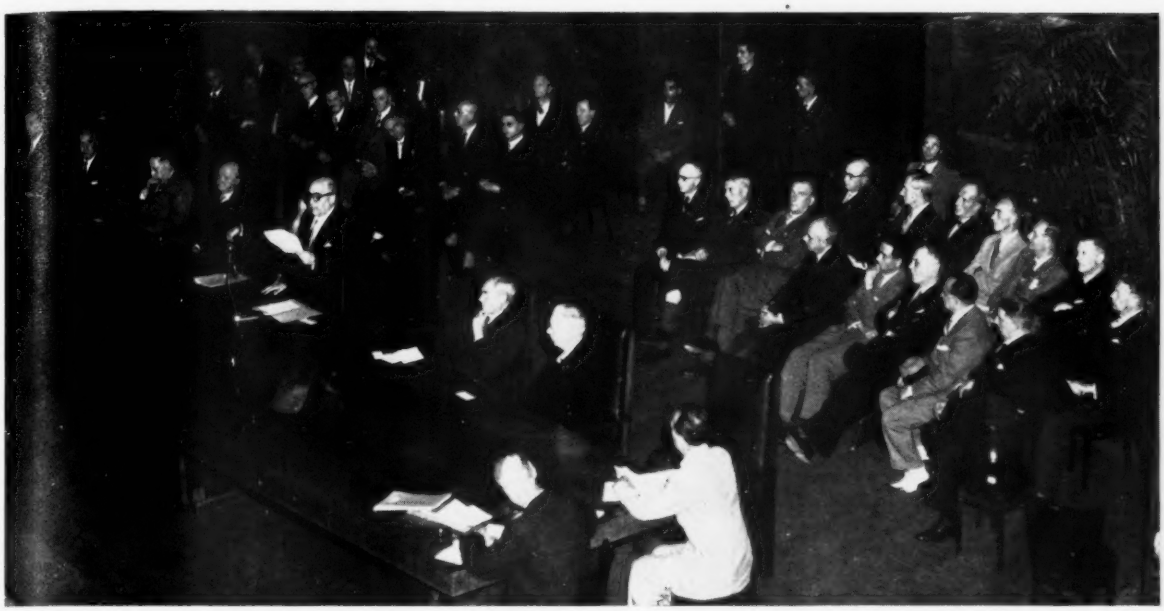
Results Obtained

The following are a few of the results obtained from the technical point of view on the quality of the work. The adoption by some railways of larger sections, with gangs made mobile by trolleys or buses, has enabled manpower to be utilised to the best advantage. It ensures adequate strength at any point, but the average standard of the track is probably not improved. There is no doubt that new methods generally are tending to raise the standard of the track, and that the more systematic the organisation becomes the better is the condition of the track. The quality of the work produced by mechanical methods is generally superior to that done by hand at the present time, though machines have been adopted primarily as labour-saving devices and as aids to manpower. An advanced stage of mechanisation to which track men have become accustomed does, however, make them less willing to do the work manually when no machine is available. Moreover, as it is not economically possible to equip every gang with all the machines required during a season, the work has to be planned much more closely if the maximum use is to be made of the equipment. A further consideration is that well-trained operators and an adequate plant maintenance organisation are essential.

From the economic point of view, it must be realised that revision in the composition of the gangs has not generally resulted in higher output per worker, though on light-traffic lines it has enabled an adequate standard to be maintained with the smallest possible labour force. It is difficult to estimate with any precision the extent to which new methods have increased output, especially as they are so often associated with the introduction of mechanical equipment.

Flood Precautions on the L.M.R.—Some 6,000 tons of ash and 3,000 tons of ballast are to be used by the London Midland Region of British Railways to raise a mile of railway embankment 2 ft. between Beeston and Attenboro' as a precaution against flooding of the River Trent.

Opening of International Railway Congress



Signor G. di Raimondo, Director General, Italian State Railways, speaking at the International Railway Congress. On his right are M. Delory, President, M. Goursat, Vice-President, and Sir Gilmour Jenkins, Permanent Secretary to the Ministry of Transport, who is a member of the Executive Committee; on his left, Lord Hurcomb

Signor D'Aragona (left), Italian Minister of Transport, leaving the main hall after the opening of the International Railway Congress in the University buildings at Rome on September 25. On the right is Signor G. di Raimondo

Electric Locomotive for Estoril Railway

Designed for working passenger and goods services on the Lisbon, Estoril, and Cascais line

A NEW 1,500 V. d.c. mixed traffic locomotive has recently been put in service on the Estoril Electric Railway, Portugal, for use on the 5 ft. 6 in. gauge line from Lisbon to Estoril and Cascais. This locomotive, supplied by The General Electric Co. Ltd., was part of an order which also included motor coaches and trailers for passenger services, and is required for hauling passenger trains of 240 tons or goods trains of 600 tons on the Lisbon-Cascais line at maximum speeds of 50 m.p.h. and 30 m.p.h. respectively. The mechanical parts were built by the North British Locomotive Co. Ltd.

Continuous and one-hour ratings of the locomotive are:

Continuous rating, full field	840 h.p.	14,240 lb. t.e. at 21·7 m.p.h.
Continuous rating, weak field	880 h.p.	11,840 lb. t.e. at 27·3 m.p.h.
One hour rating, full field	1,080 h.p.	20,500 lb. t.e. at 19·3 m.p.h.
One hour rating, weak field	1,120 h.p.	17,600 lb. t.e. at 23·4 m.p.h.

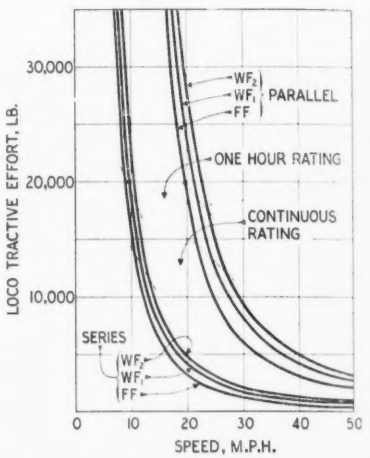
The locomotive has the Bo + Bo wheel arrangement, the tractive and braking forces being transmitted through an articulated pin connection between the bogies, which carry the buffers and drawgear. They are coupled together by a universal joint at a centre height from the rails which is 1⅛ in. higher than the centre of the buffers. The frames are built of welded steel plates.

The weight of the body is supported on side bearers with spherical seats, and on end bearers. The end bearers are of rubber and provide compensation for weight transfer between the bogies and for vertical movements of the ends of the bogies or of the body.

Both side and end bearers are free to slide sideways, and have renewable manganese liners which do not require lubrication. Total sideways movement of the bogie centre, under the control of a pair of laminated springs, is 1½ in. The rolled steel disc wheels have the tyres integral with the centres, and the axleboxes are equipped with oil-lubricated Timken tapered roller bearings. All the wearing faces of the axleboxes and guides are faced with manganese steel liners secured by welding. These are intended to run without lubrication. The spring links of the laminated suspension springs each carry an auxiliary rubber damping spring.

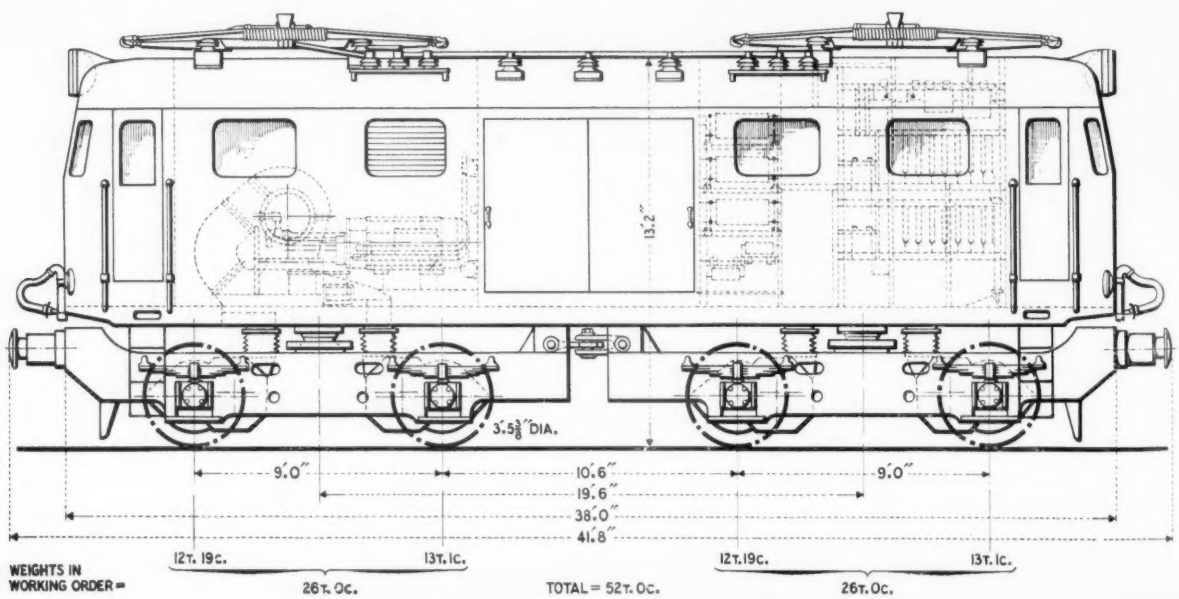
All four wheels of each bogie are provided with sanding gear, with two sandboxes for each direction of running, operated by compressed air. The controls in the cabs are arranged so that when the sanding pedal at the forward end of the locomotive is depressed, the rails are sanded from the four boxes which are ahead of the wheels.

The body is built of thin mild steel sheets, which are welded to light pressed steel section stiffeners, and mounted on rolled steel joist longitudinal strakes. On each side of these strakes, below the floor, are ducts, one carrying the electric cables and the other the cooling air from the blower to the motors in No. 2 bogie. Leather bellows connect the duct to these motors, but the other pair is supplied direct through bellows from the blower. The cable duct has access doors from above, and doors in the floor also give access to the batteries. The roof over the machinery compartment can be removed when repairs to the auxiliaries have to be carried out.



Locomotive performance graph

Internally, the body is divided into separate compartments for the auxiliary machines, resistances, and h.t. apparatus, with a free space in the centre for baggage. The resistances are mounted in banks, and access to them is by means of removable panels on three sides,



Overall dimensions and weight distribution of locomotive

from the baggage compartment, the side corridor, and the h.t. compartment.

Electrical Equipment

Two air-operated pantographs are fitted, each with its own roof-mounted isolating switch. Only one pantograph need be used in normal service, but both may be employed together for working the heaviest loads.

A main isolating switch is provided inside the h.t. compartment, with its operating handles outside in the corridor. When this is operated, the pantographs are lowered, the 1,500 V. circuits are earthed, and the safety locks on the h.t. compartment door are released, permitting access from the side corridor.

Two axle-hung traction motors are mounted in each bogie, and drive the axles through single-reduction gearing with a ratio of 67:16. Forced ventilation is provided by a blower in the machinery compartment, part of the output from which is used for cooling the starting resistances.

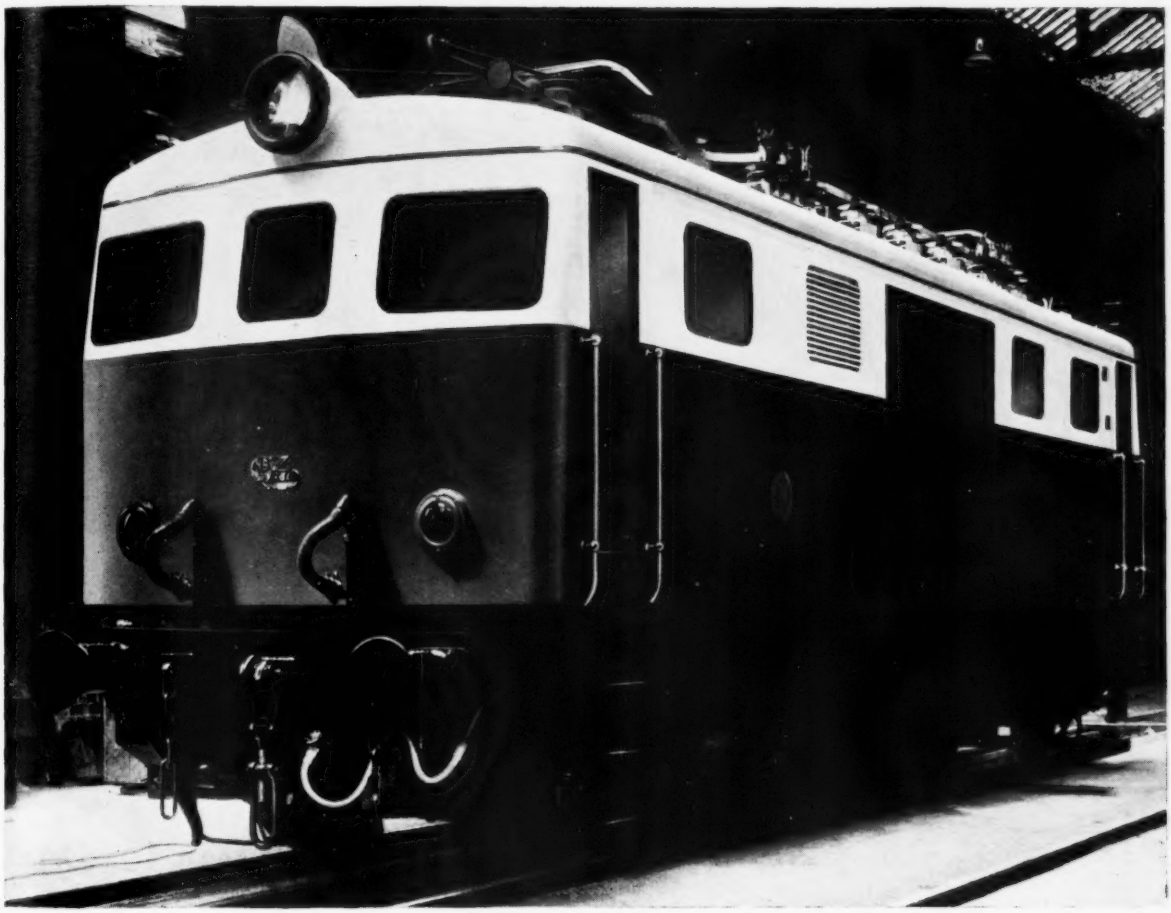
The traction motors are constructed in accordance with the latest practice, particularly as regards the insulation, which is designed to withstand high operating temperatures and the severe vibration characteristic of traction service.

The armature is carried on grease-lubricated roller bearings, the bearing at the commutator end being enclosed in a housing in such a manner that the armature can be removed from the shell without opening up the bearings. There is no separate end housing at the commutator end of the motor frame, which permits the use of an extremely rigid brushgear of a type used on G.E.C. traction motors for a number of years. Cooling air, entering by means of flexible bellows at the commutator end, passes between the field coils and over the armature surface, and also through ducts in the armature core. A small auxiliary fan is provided on the armature; this creates some ventilation to minimise overheating and allows the motors to be worked without forced ventilation for short distances in an emergency.

The motor suspension bearings are of the sleeve type, oil being fed to the bearings by means of wool packing. The drive from motor to axle is by means of single-reduction gearing manufactured by Alfred Wiseman & Co. Ltd.; the gears are enclosed in a substantial sheet steel gear case, designed to be as oil-tight as possible for the restricted space available.

Total weight of each motor, including gears and gearcase, is 6,940 lb. The ratings at 750 V., to B.S.S. 173/1941, are: Full field, 210 h.p. (continuous), 270 h.p. (one-hour); weak field, 220 h.p. (continuous), 280 h.p. (one-hour).

Both motors in each bogie are permanently in series, and control is effected by series or parallel connection of the pairs. Either pair of motors can be isolated in emergency, limited operation of the locomotive being possible on the other two.



Mixed-traffic locomotive supplied to Estoril Electric Railway by the General Electric Co. Ltd. The mechanical parts were built by the North British Locomotive Co. Ltd.

Control System

Control is by means of electro-pneumatic contactors. The first ten notches on the master controller are resistance notches. Full series is reached on notch 11. For transition to parallel the reverse and combination handle is moved from "forward series" to "forward-parallel" and the accelerating handle is returned to notch 2, which is located automatically by depressing a

button on the end of the handle. Transition then takes place by the shunt method, after which the equipment is notched up to full parallel by advancing the accelerating handle again to notch 11.

Notch 1 on the controller introduces a section of the main resistance which is used only when starting or for light running of the locomotive. Consequently it is not required during acceleration in parallel, in which only nine resistance steps are used. The total of 19 resistance notches provides for satisfactory handling of widely varied weights of train in different conditions of adhesion.

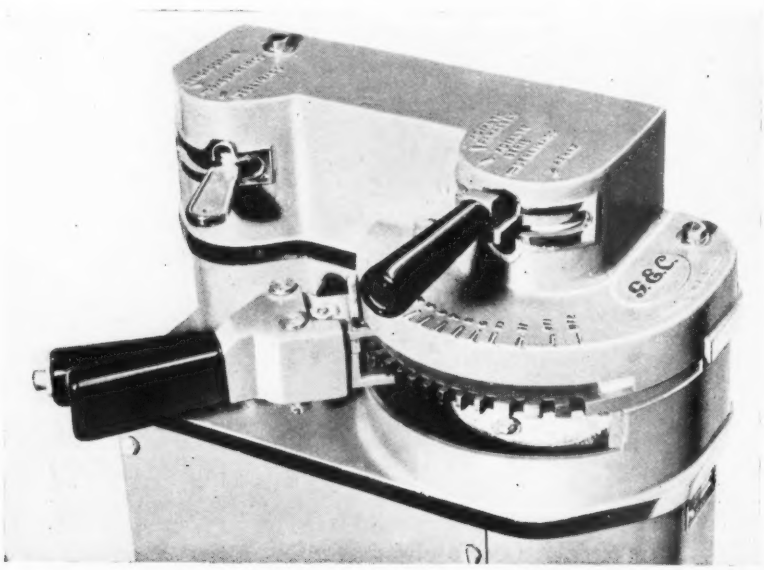
Two weak-field notches are provided on the accelerating handle quadrant. These may be used both in series and parallel, so that a total of six economical running speeds is available. On the first of these notches a non-inductive diverter resistance is connected across part of the fields. Minimum field is obtained by cutting these sections of the windings out of circuit.

The control switch on the master controller has two "on" positions, one of which is used when working passenger trains and the other for goods traffic. These are associated with emergency braking initiated by release of one of the dead man's treadles. In the "goods" position the opening of the vacuum emergency valve in the train pipe is delayed until the application of the locomotive air brake has begun so that the train is allowed to close up. Two dead man's treadles are provided in each cab.

As the main resistance sections are in parallel during parallel operation of the motors, there is an overload relay in each motor circuit, and a third in the main trolley line to protect the circuits on the positive side of the motor relays. When any of these relays operates, a section of the main resistance is brought into circuit before the line contactors open, to limit the current they have to break.

No-volt protection is provided by means of a system employing a no-current relay, which opens all power circuits in the event of a failure of the traction current. After this has operated, the master controller must be returned to "off" before the power circuits can be re-established.

Interior of driving cab, master controller pedestal in foreground



Faceplate and operating handles of master controller

Auxiliary Machines

All the auxiliary machines are housed in a compartment adjacent to No. 1 driver's cab. They comprise a 1,500/110 V. motor generator set for control and lighting supplies; a G. D. Peters motor-compressor set for the Westinghouse brakes on the locomotive, the electro-pneumatic contactors, pantograph operation, sanding and horn; an exhauster for vacuum braking on the train; and a blower to supply cooling air for the motors and resistances. All these machines operate at 1,500 V. d.c. The blower motor is started by the same contactor as the motor-generator, but the latter can be isolated by a switch in case of emergency to allow the blower to be operated independently. A 110 V. battery carried in the underframes, accessible from the baggage compartment, floats across the generator output and supplies all the locomotive lighting when the generator set is not running. The coach lighting is fed from the generator over jumper cables between the vehicles.

The motor generator set is identical with those used on the new motor coaches recently supplied to the Estoril Electric Railway by the G.E.C. and has an output of 8 kW. at 110 volts d.c. so as to provide for the train lighting in addition to other loads. The set is of the usual traction type, in which the

motor and generator are mounted on a common shaft with a bearing at each end, the armature assembly being mounted in a single frame in which are separate field systems for both motor and generator.

The motor is a two-pole compound wound machine, the shunt winding being fed from the 110 volt supply. The generator has four main poles but no interpoles, the main poles being excited from the 110 volt output *via* a voltage regulator. A small field winding in series with the motor armature is fitted to ensure the generator building up with the correct polarity. Class B insulation is used throughout the machine, all light current windings being of glass-covered wire.

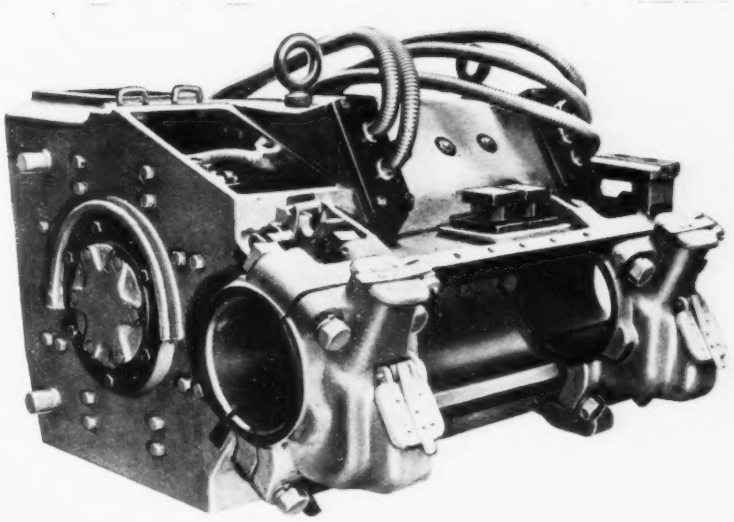
As the machine is interchangeable with those used on the motor coaches, it must be suitable for underframe mounting and therefore is of the totally enclosed frame-cooled type, air passing from the fan through ducts on the outside of the shell, which is ribbed to assist cooling further.

The Westinghouse type 4V110 exhauster is driven by a 1,500 volt two-pole series motor continuously rated at 3 h.p., 600 r.p.m., and with an intermittent rating of 6 h.p. at 1,200 r.p.m. The high speed is obtained by one step of field weakening effected by means of a tap, and is used when releasing the brakes. As this machine also is interchangeable with those on the motor coaches, it is totally enclosed so as to be suitable for underframe mounting.

The Keith Blackman type 21 blower is driven by a two-pole, self-ventilated series motor rated at 8 h.p. at 1,250 r.p.m., and supplies cooling air to the four traction motors and the resistance compartment.

The construction of all auxiliary machines is similar and, in fact, many of the parts are identical, thus facilitating maintenance.

In the cabs, all the instruments are grouped in a desk form of structure at the front, with the master controller and brake controls to right and left respectively of the driver's tip-up seat. The controls are arranged for easy manipulation when seated or standing. The cab equipment includes electric windscreen wipers and speedometers as well as the usual meters.



One of the four axle-hung traction motors

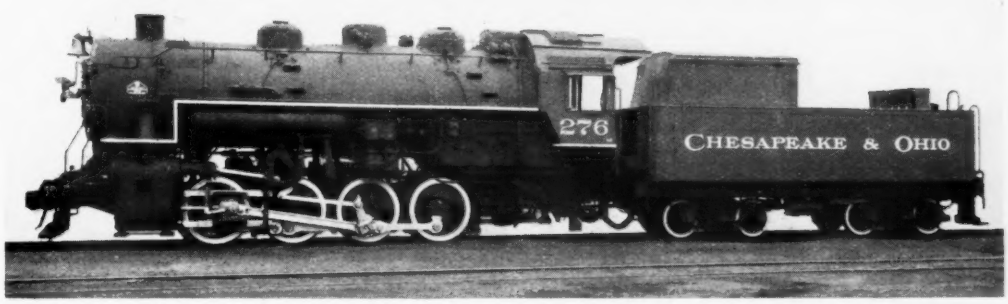
Braking System

The brake equipment was supplied by the Westinghouse Brake & Signal Co. Ltd. The brakes on the locomotive are applied by compressed air, but since the coaching stock is vacuum-braked, the locomotive also has to maintain and apply both brakes as required. When running light or pulling unbraked stock, the driver applies the air brake only, but when coupled to vacuum-braked coaches the driver's vacuum brake-valve is used. An application of the brake through this valve automatically applies the brakes on the locomotive through the action of a vacuum-operated air proportional application valve.

The locomotive brakes can be applied or released independently even when coupled to vacuum-braked coaches. This is accomplished by electrical contacts on the driver's air brake valve, which complete a circuit when a trigger on the handle is depressed, energising a brake cylinder cut-out magnet valve. The trigger can be operated in any position of the brake valve handle and permits the driver to release the locomotive brake when the train brake is applied, or to make gradual independent applications.

A hand parking brake in each cab applies the brake on the adjacent bogie. The brake rigging is fully articulated and of the clasp type, with two brake blocks for each wheel, and two brake cylinders on each bogie.

0-8-0 Shunting Locomotive for Chesapeake & Ohio Railway



Baldwin Locomotive Works has completed 30 *shunting locomotives for the Chesapeake & Ohio Railway. These locomotives have* 25-*in. by* 28-*in. cylinders,* 4-*ft.* 4-*in. wheels, and a tractive effort of* 57,200 *lb.; the rigid wheelbase is* 10 *ft.*

French Railway Motive Power

(See also our September 22 issue)

One of the latest 4,400-h.p. 2-Do-2 1,500-V. electric locomotives of the Region du Sud-Ouest, passing Ablon at the head of train 1, the down Sud Express, made up of Pullman and ordinary stock

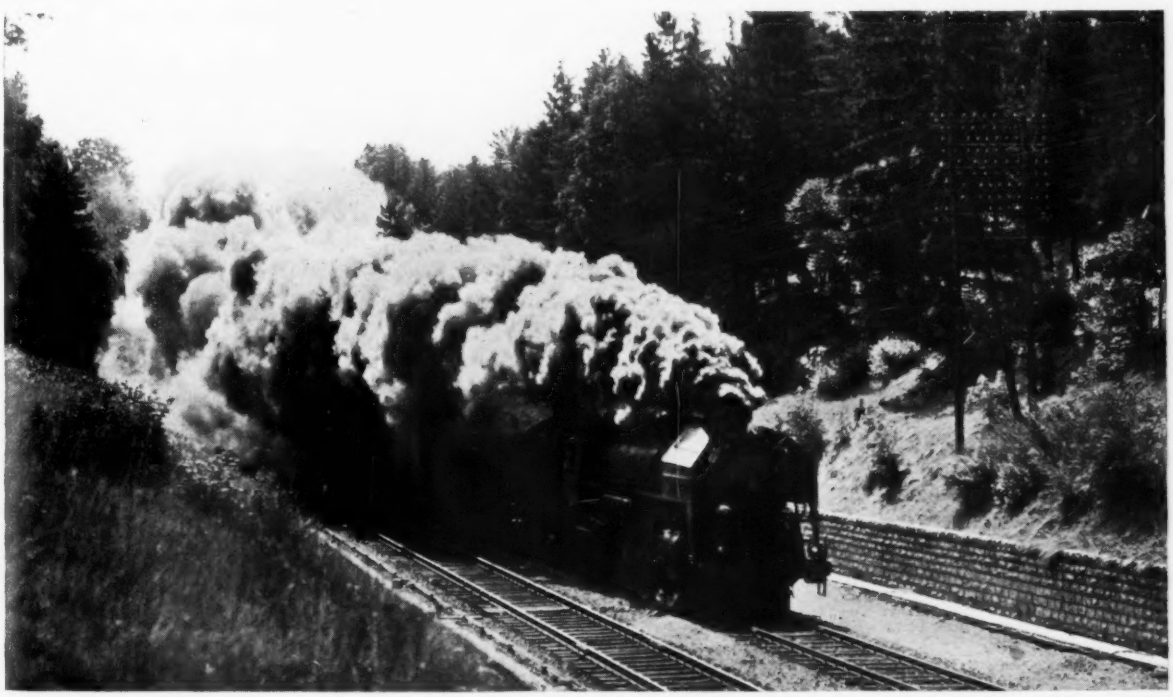
One of the new 100-ton Co-Co express electric locomotives of the French National Railways with an 18-coach passenger train of approximately 850 tons weight

Photos] [G. F. Fenino

French Railway Motive Power

(See also our September 22 issue)

Up Riviera express on the Region du Sud-Est of the French National Railways hauled by one of the twin-unit 4,400-b.h.p. 220-ton diesel-electric locomotives



One of the 1,300 American-built post-war 2-8-2 two-cylinder simple engines working a fast freight train on the French National Railways

Photos] [G. F. Fenino

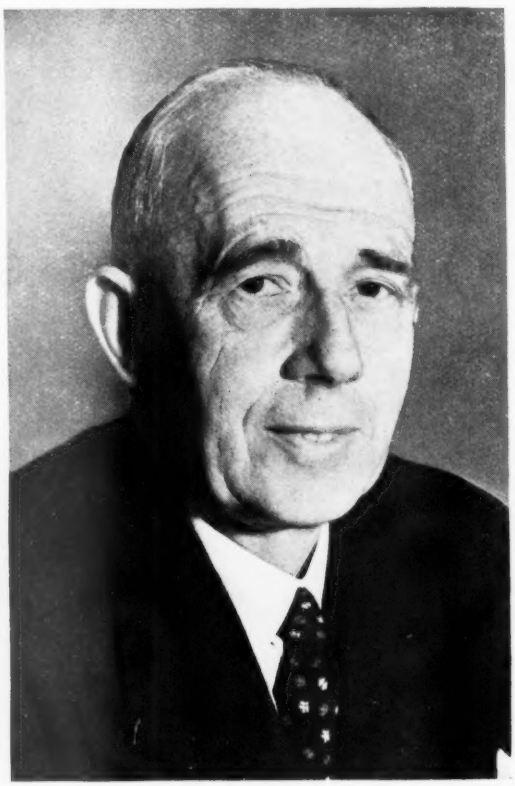
RAILWAY NEWS SECTION

PERSONAL

Mr. J. R. Luis, Sub-Manager of the General Roca Railway, Argentina, has been appointed General Manager of the D.F. Sarmiento Railway.

Mr. George Morton, C.B.E., M.Inst.T., Chief Financial Officer of the Railway Executive, who as recorded in our issue of September 22, is retiring on October 31, was educated at the Lower School of John Lyon, Harrow, and joined the Audit Department of the L.N.W.R. in 1901. He became Chief Clerk of the Department in 1921 and Senior Divisional Audit Accountant of the L.M.S.R. in 1923. Two years later he was appointed Audit Assistant to the Chief Accountant and in 1930 he became Assistant Chief Accountant. Mr. Morton was made Chief Accountant of the L.M.S.R. in 1937 and, on the formation of the Railway Executive in January, 1948, was appointed Chief Financial Officer. He was responsible for several reorganisation schemes within the L.M.S.R. Accountant's Department, the largest of which was the merging of the various English divisional audit offices of the company in 1926. He has visited America to study railway accounting methods in that country, and has been the means of displaying British railway accounting practices to representatives of other countries. Mr. Morton acted for several years as an investigator of railway companies' compensation claims against the Government in respect of the control of the railways during the 1914-18 war. He has taken part in Clearing House conferences over a long period and has been Chairman of the Railway Statistics Committee for several years. He was closely concerned in the setting-up of the financial structure connected with the London Passenger Pooling Scheme and other similar arrangements. During the recent war he played a prominent part, under the ægis of the Ministry of Transport, in the financial negotiations relating to the hire and repair of the large fleet of requisitioned privately-owned wagons; he was appointed a Member of the Executive of the L.M.S.R. in the summer of 1947. He is a past Member of the Council of the Institute of Transport. Mr. Morton received the honour of C.B.E. in the 1948 New Year Honours List.

Mr. George Morton
Chief Financial Officer, Railway Executive, who is retiring



Mr. V. Radford
Appointed Chief Financial Officer, Railway Executive

Viscount Falmouth and Mr. F. P. I. Crossley have been appointed additional Directors of Crossley Brothers Limited.

Mr. C. Hartman, B.Sc. (London), District Superintendent, Leeds, British Railways, North Eastern Region, has been appointed District Operating Superintendent, Lincoln, Eastern Region.

Mr. W. A. Ankerson, B.Sc.(Eng.), A.M.I.E.E., has been appointed Manager, Dominions Division of the Metropolitan-Vickers Electrical Export Co. Ltd., in succession to Mr. J. W. Bell, who will continue in an advisory capacity.

Mr. Gordon Yates, one-time General Assistant to the Chief Hotels Superintendent, L.M.S.R., who, since nationalisation, has been attached to the headquarters of the Hotels Executive for special duties connected with publicity for the hotels, refreshment rooms, and restaurant cars, of the Executive, has been appointed Publicity Officer to the Hotels Executive.

Mr. V. Radford, M.Inst.T., Assistant Chief Financial Officer, Railway Executive, who has been appointed Chief Financial Officer as from November 1, was born in 1896 and commenced his railway service in the Office of the Chief Accountant of the Midland Railway at Derby in 1911. From 1915 to 1919 he served in the Royal Navy, and after returning for a short time to the Midland Railway, joined the Finance Department of the Ministry of Transport as an investigator of Railway Accounts under the Control Agreement. In 1928 Mr. Radford joined the L.M.S.R. and took charge of a newly-formed section introduced by Lord Stamp. He became Assistant to the Chief Accountant in 1934 and on the formation of the Railway Executive he was appointed Assistant Chief Financial Officer. During the last ten years of his service with the L.M.S.R. Mr. Radford's duties included those of Financial Liaison Officer between the railway companies and the Hays Wharf Cartage Group; he was also Chairman or a member of several railway accountants' sub-committees during the period 1939 to 1947.

The International Railway Congress

Opening proceedings in Rome

The fifteenth session of the International Railway Congress Association, held in Rome after 30 years, opened on September 25. Proceedings began with a reception by the Municipality of Rome, when more than 500 delegates (representing railways in some 30 countries) and their ladies were welcomed to Rome by the Mayor, Signor Rebecchini, in the halls and galleries of the Capitol.

The formal opening ceremony later took place in the conference hall of Rome University. Signor D'Aragona, Italian Minister of Transport, presided, supported by Signor Giovanni di Raimondo, Director-General of the Italian State Railways, and Chairman of the Italian Executive Committee of the Congress, Monsieur F. H. Delory, President of the International Railway Congress Association and Director-General of the Belgian National Railways, Monsieur J. M. Goursat, Vice-President of the Executive Committee of the Congress and Director of the Northern Region, French National Railways, Lord Hurcomb, Chairman of the British Transport Commission, and Sir Gilmour Jenkins, Permanent Secretary to the Ministry of Transport (Members of the Congress Executive Committee), and by Monsieur P. Ghilain, Secretary-General of the Congress Association. Also present were the Prime Minister of Italy, Signor de Gasperi, and representatives of the Italian Government and Members of the Permanent Commission, including Members of the Railway Executive of British Railways.

Declaring the session open, Signor D'Aragona recalled that this was the third occasion on which the Congress was held in Italy, having met at Milan in 1887 and Rome in 1922. He hoped that further technical progress achieved by the world's railways as the result of this and other congresses would contribute to better communications and better understanding between the nations.

Monsieur Delory expressed thanks on behalf of the delegates to the representatives of the Italian Government, whose presence had greatly honoured the Congress Association. He also thanked the Minister of Transport for his welcome to the Congress. He then recalled the past activities of the Association and outlined its present scope, and stressed the seriousness of the competition with railways by other forms of transport. Outlining the agenda, Monsieur Delory draw attention to the importance of the reports and papers dealing with bridge construction, maintenance of secondary lines, comfort of passengers, marshalling yards, wagon-load traffic, operating costs, and staff welfare. He then proposed the nomination of Signor di Raimondo as President for the Session.

Replying, Signor di Raimondo referred to the particular interest of the present session in finding a solution for road and other forms of competition and to the necessity for economic co-ordination between the different forms of transport. Railways, he said, would always remain the basic element in any system of transport. He illustrated his remarks with numerous instances, showing that in achieving their aim of fulfilling their duty to the State and to the public, railways had to bear heavy financial burdens from which other forms of transport were exempt. Despite this, the railways must reduce operating costs and continue to improve their services.

The second day of the session was devoted to sittings of the various Sections, namely: Section I (Way & Works): President, Monsieur R. Claudon, of the French National Railways; (Vice-Presidents include Mr. T. C. Courtney, Chairman of Coras Iompair Eireann, and Mr. K. C. Bakhle, of the Indian Railway Board); Section II (Locomotives & Rolling Stock): President, Lord Hurcomb; Section III (Working): President, Signor A. C. Palmieri, of the Italian State Railways (Vice-Presidents include Mr. R. J. Harvey, Consulting Engineer to the New Zealand Government); Section IV (General): President, Dr. J. Wansink, Director-General of the Netherlands Railways (Vice-Presidents include M. G. Lindenberg, Advisory Engineer to the Government of South Africa; Section V (Light & Colonial Railways): President, Monsieur W. Vrielynck, of the Belgian National Light Railways Company (Vice-Presidents include Mr. H. Sparrow, Chief Mechanical Engineer, North Western Railway of Pakistan). Papers were read, digests of some of which have already been given.

Among the delegates attending the Fifteenth Congress are :—

Austria: Dr. E. Seidler, Director-General of the Federal Railways; *Belgium*: Monsieur F. H. Delory, Director-General of the National Railways, and Monsieur M. Malderez, Secretary, Ministry of Communications; *Denmark*: Mr. E. Terkelsen, Director-General of the State Railways, and Mr. Christensen, Secretary, Ministry of Works; *East Africa*: Mr. T. W. Eydes, East African Railways & Harbours; *Egypt*: Dr. Sayed Wahid Bey, Director-General, State Railways; *Finland*: Mr. H. Roos, Director-General, State Railways; *France*: Monsieur J. M. Goursai, Director, Northern Region, National Railways.

Great Britain: Lord Hurcomb, Chairman, British Transport Commission, Sir Gilmour Jenkins, Permanent Secretary of the Ministry of Transport, Messrs. W. P. Allen, V. M. Barrington Ward, David Blee, and J. C. L. Train, Members, Railway Executive; Mr. John Elliot, Chief Regional Officer, London Midland Region, British Railways; Mr. John Cliff, Member, London Transport Executive.

India: Messrs. K. C. Bakhle, V. V. Bidhe, C. H. De Souza, and B. B. Varma, representing the Railway Board; *Ireland*: D. Morrissey, Minister for Industry and Commerce, Mr. T. C. Courtney, Chairman, Coras Iompair Eireann, and O. V. Bulleid, Consulting Engineer, C.I.E.; *Italy*: Signor G. di Raimondo, Director-General, State Railways, and Signor M. Valdivieso, Secretary of the Congress Executive Committee; *Luxembourg*: Monsieur A. Clemang, Government Railways Representative; *Netherlands*: Mr. F. Q. Den Hollander, Director General, Netherlands Railways; *Malaya*: Mr. J. O. Sanders, General-Manager, Malayan Railway; *Nigeria*: Mr. G. H. Binnie, Nigerian Railways; *Norway*: Mr. Sven Boye, Norwegian State Railways.

Pakistan: Mr. M. H. Elliott, Eastern Bengal Railway and Mr. H. Sparrow, North Western Railway; *Portugal*: Senhor R. da Costa-Couvrevr, representing the Portuguese Government; *Sweden*: Mr. E. G. J. Upmark, General Manager, State Railways; *South Africa*: M. G. Lindenberg, South African Railways and Harbours; *Spain*: Señor J. Rivero de Aguilar and Señor F. Villamil, Spanish National Railways; *Switzerland*: Monsieur P. Buchli, Rhaetian Railways, Messrs. P. Kradolfer and W. Meile, Presidents, and F. Wanner, Secretary-General, Swiss Federal Railways; *Turkey*: Monsieur K. Ocman, State Railways.

Western Germany: Dr. W. Helberg, Director-General of the Federal Railways; *Central International Transport Office*: Mr. R. Cottier; *International Sleeping Car Company*: Monsieur R. Margot-Noblemaire, Managing Director.

British Railways Standard Locomotives

Some 160 *locomotives of six new standard designs to be built next year*

The first standard locomotives designed for a wide range of use on British Railways will go into production this autumn, and will be in service early in 1951, as was intimated in our editorial article in our January 7, 1949, issue. Of the new locomotives planned for next year some 160 will be of these new standard designs, and their construction will be shared between the railway works at Crewe, Derby, Swindon and Brighton, though other works will continue the building and repair of previous designs.

Of a possible 12 new standard types with which it is intended eventually to cover the work of the present range of 400 designs, six will be represented in the 1951 programme. All are being designed for mixed-traffic purposes so as to give the maximum inter-availability of use within their power range; the two bigger designs, for example (of the 4-6-2 type), will be interavailable for express passenger, or fast freight-trains.

British Railways designers have been working for two years on plans for the new locomotives, and the best practices of all Regions have been studied with the object of embodying in the new engines maximum ease of access for servicing and repair, economy of coal consumption, and a high degree of inter-changeability of parts. In consultation with the trade unions and representative enginemen, a special effort has been made to provide the best possible amenities for footplate crews.

So that the new locomotives can be used on as wide a range of routes as possible, they are being designed to fit new standard loading-gauges, for the whole of British Railways, which have been determined under the direction of and in collaboration with Mr. J. C. L. Train, Member of the Executive for Civil Engineering.

In the design of the new locomotives, under the direction of Mr. R. A. Riddles, Member of the Railway Executive for Mechanical & Electrical Engineering, all features calculated to increase mileage between repairs are being embodied to give maximum economy in operation, consistent with an adequate reserve of power for the traffic requirements. The largest possible grate area is being provided for each engine. Roller bearings will be fitted throughout on the largest types, all tenders will have roller bearings, and the fitting of manganese liners to all coupled axleboxes will be standard. Fittings and details will be highly standardised throughout all the engines.

Each of the four mixed-traffic tender types to be introduced in 1951 will have

a greater range of user for comparable traffics than the present types to which it bears relation. The 4-6-2 locomotives numbered 70000-70024 are designed to be capable of undertaking the duties and of working over all routes now used by such types as the "Castles," "West Country" 4-6-2s, L.M.R. Class "6" 4-6-0s and "V2" 2-6-2s. The other 4-6-2 locomotives, Nos. 72000-72009, which have lighter axle-loads, are designed to cover the duties of such engines as the W.R. "County" and L.M.R. Class "5X," and the heavier duties now performed by the L.M.R. Class "5" and ex-L.N.E.R. "B.1" classes.

The two other tender classes to be introduced, Nos. 73000-73009, comprise a mixed-traffic 4-6-0, comparable in performance with several existing designs, and a lightweight 4-6-0, Nos. 75000-75019, planned to replace, with a greater range of availability and with full modern equipment, numerous classes of 4-4-0s now becoming obsolescent.

There are also two classes of tank engine: a 2-6-4 tank for residential passenger and similar duties required of this type, and a 2-6-2 tank for light passenger, freight and shunting work.

Further details of the locomotives to be constructed and their allocation are given below:—

Wheel arrangement	Parent office of design	Number to be built	To be built at	Engine running numbers	To be allocated to Region
4-6-2 Tender	Derby	25	Crewe	70000-70014	15 Eastern
				70015-70024	10 Western
4-6-2 Tender	Derby	10	Crewe	72000-72009	10 Scottish
4-6-0 Tender	Doncaster	30	Derby	73000-73004	5 Scottish
				73005-73029	25 London Midland
4-6-0 Tender	Brighton	20	Swindon	75000-75009	10 Western
				75010-75019	10 London Midland
2-6-4 Tank	Brighton	54	Derby	80000-80009	21 Scottish
			Brighton	80020-80030	
				80010-80019	10 Southern
				80031-80033	3 North Eastern
				80034-80053	20 London Midland
2-6-2 Tank	Swindon	20	Swindon	82000-82009	10 Southern
				82010-82019	10 Western

East Indian Railway Annual Dinner

The 47th annual dinner of the East Indian Railway Officers' Dinner Association was held at the Connaught Rooms, London, on September 27, Mr. S. J. P. Cambridge, a former General Manager, presiding. The following were present and comprised 51 members of the Association and ten guests:—

Members: Messrs. S. W. Abel, H. J. Allinson, J. A. Bell, C. N. Burns, S. J. P. Cambridge, D. D. Cruickshank, A. J. Doran, J. D. Donaldson, R. J. Earle, E. R. Fleeton, Brigadier Gardiner, R.E.; Messrs. J. C. Gibson, A. R. Gundry, Sir Hugh Hannay; Messrs. G. R. G. Huddleston, C. G. B. Hinchley, J. W. C. Holt, P. J. Hadley, J. H. Hardman, A. E. Hubbard, P. Hackforth, H. Howe, R. C. Harvey, R. G. Hughff, J. R. Hemsley, P. L. J. Hands, W. A. Jameson, G. T. Lemon, J. T. Lambe, E. H. N. Lowther, F. G. S. Martin, Sir Robert Marriott; Messrs. J. A. Morris, T. S. Mills, E. G. Mayes, H. W. Puttick, G. W. N. Rose J. Robertson, F. E. Robertson, W. Ramsey, B. Severs, H. J. A. Slater, O. R. Tucker, D. F. Tawse, L. D. J. Turnbull, A. V. Venables, R. M. Watson, W. W. Whitney, H. C. Wallace, R. B. H. Whitby, W. J. Walters.

Guests: Sir Henry Braund, Messrs. E. S. Cox, Colonel Emerson, R.E.; Messrs. A. W. Goldsack, A. B. Hannay, H. W. Mills, W. R. Oaten, F. H. Pope, R. R. Parker, and J. S. Tritton.

In proposing the toast of the evening, the East Indian Railway, the Chairman first expressed his thanks to the permanent committee of the Association for having done him the honour of inviting him to take the chair; an honour he greatly appreciated, especially so in view of his having started at the bottom of the ladder on a salary of one rupee a day, when he first joined the East Indian Railway 38 years ago. In moments of leisure, which were only too few, he looked back with pleasure and pride on his years of service, and he emphasised how much he appreciated the utmost assistance he had always received.

Proposed Re-Grouping of E.I.R.

Mr. Cambridge, continuing, said that many of them would be sorry to hear that the East Indian Railway would shortly undergo a major surgical operation. Under the proposed new grouping, it would extend from Howrah to Kanpur, and would include that portion of the old Bengal North Western Railway, now the Oudh & Tirhut Railway, east of Chupra, the whole of the Assam Railway, and the whole of the coalfields area of the Bengal Nagpur Railway. He supposed that those in authority were right, but it was with regret that they realised that the East Indian Railway, as they knew it, would cease to be.

He mentioned that there were still serving no less than 77 European and Anglo-Indian officers, who were still serving the railway, and contributing in no small measure towards maintaining the efficiency for which that railway had always been justly proud. He then referred to the many changes that had taken place during his 38 years of service, particularly the amalgamation of Oudh & Rohilkund with the East Indian Railway just 25 years ago. At first those on the East Indian were inclined to view those of the O. & R. as people of a strange land. It was not long before they realised that they were, in fact, an excellent team, and he took this opportunity of paying them a tribute.

It was unfortunate, perhaps, that the terms and conditions of service were so different; they should have been the same for all, instead of which, they had state railway terms, East Indian Railway terms, and others. However, they survived, and were here to pay tribute to their railway. Referring to the transfer of power to the peoples of India, and with it, the premature retirement of many railway personnel, there were many who thought that the days of efficiency on Indian Railways were numbered. How little faith they had in the foundations laid not only by our forefathers, but also by those present.

Mr. Cambridge then proposed the toast of the E.I.R. and wished the railway prosperity in the future. He subsequently proposed the health of the guests, a toast to which Sir Henry Braund briefly replied, thanking the E.I.R. officers for their hospitality, which he was sure they had all enjoyed.

Mr. A. R. Gundry, proposing the health of the Honorary Secretary, Mr. E. H. N. Lowther, said that he had put in a great deal of hard work, and also suggested that those intending to be present at future dinners should let him know as early as possible.

Mr. Lowther, replying, said that thanks were due to Sir Hugh Hannay, Chairman of the Committee, from whom he had the greatest assistance.

Public Transport Association Luncheon

The annual luncheon of the Public Transport Association Incorporated was held at the Connaught Rooms, London, on September 28.

Mr. Henry Spurrier, Vice-President of the Society of Motor Manufacturers & Traders Limited, proposed the toast of "The Public Transport Association," said that this year's Commercial Motor Exhibition was the greatest of its kind. The road transport industry had grown from infancy to maturity between the wars, but he felt that its development had come almost to a full stop because of the corresponding lack of development of trunk roads. The Association was powerful enough to press for better roads. He concluded with a plea that there should be some form of free competition in road services and equipment.

In his reply, Mr. G. F. Sinclair, Chairman of the Council of the Public Transport Association Incorporated, congratulated Brigadier-General Sir Osborne Mance, who was present, on his successful year of office as the President of the Institute of Transport, and referred also to Sir Joseph Nall and Sir Theodore Thomas, who also attended. Mr. Sinclair said that he considered that the greatest contribution to lower costs and increased productivity in the motor manufacturing industry could be obtained from simplification and standardisation. There could be interchangeability between different makes of chassis without detracting from basic designs. There was no need, in applying standardisation, to adopt a process of levelling down of quality—on the contrary, greater accuracy and better finish could be accomplished at less cost.

Hawarden Station to be Rebuilt.—British Railways (London Midland Region) expect to begin work at the beginning of 1951 on the reconstruction of Hawarden Station, Flintshire, the roof of which was destroyed by fire during the war. The intention is to use the existing walls, but reconstruct the interior to give a much larger waiting room and up-to-date toilet and booking facilities.

Bus Shelters to Commemorate Festival of Britain.—Bus shelters are to be built throughout the country as a permanent reminder of the 1951 Festival of Britain. Each shelter will bear the Festival's emblem, Britannia's head on a compass star, and where possible will be built of local materials, such as Cotswold or Oxford stone, and in any case must look well against the existing background. The estimated cost of each shelter will be about £125.

Safety Awards to U.S.A. Railways

The E. H. Harriman Memorial Gold Medals for the best safety records in 1949 among the United States railways were awarded at a dinner at the Hotel Ambassador, New York City, on September 20. The Norfolk & Western Railway received the gold medal for Class A railways, the Western Maryland Railway for Class B railways, and the Colorado & Wyoming Railway for Class C railways.

Certificates of Commendation for outstanding performance in railroad safety, were awarded to the following:—

Eastern District—
Class A—Erie Railroad
Class B—Pennsylvania-Read ng Seashore Lines
Class C—Detroit & Mackinac Railway
Western District—
Class A—Union Pacific Railroad
Class B—Duluth, Missabe & Iron Range Railway
Class C—Texas Mexican Railway
Southern District—
Class A—Louisville & Nashville Railroad
Class B—Gulf, Mobile & Ohio Railroad
Class C—Tennessee Central Railway

This year, two additional Certificates of Commendation were awarded to the Baltimore & Ohio Chicago Terminal Railroad (Group ST-1), and Birmingham Southern Railroad (Group ST-2).

The E. H. Harriman Memorial Medals, which were founded in 1913 by the late Mrs. Mary W. Harriman in memory of her husband, Edward H. Harriman, had been awarded 30 times by the American Museum of Safety.

The awards were presented by Mr. James G. Lyne, Editor, the *Railway Age*, and Chairman of the Award Committee, American Museum of Safety. Mr. Wallace J. Falvey, President of the Museum, presided, and Colonel Robert S. Henry, Vice-President, Association of American Railroads, spoke at the dinner. Mr. Julien H. Harvey, Chairman, Arthur Williams Memorial Award Committee, presented the Arthur Williams Memorial Medal to Mr. Arthur V. Rohweder, Superintendent of Safety & Welfare, Duluth, Missabe & Iron Range Railway.

The awards are determined on the basis of the official records of the Interstate Commerce Commission for 1949, railways being ranked in groups according to their individual safety ratings.

7,000th Engine Built at Crewe

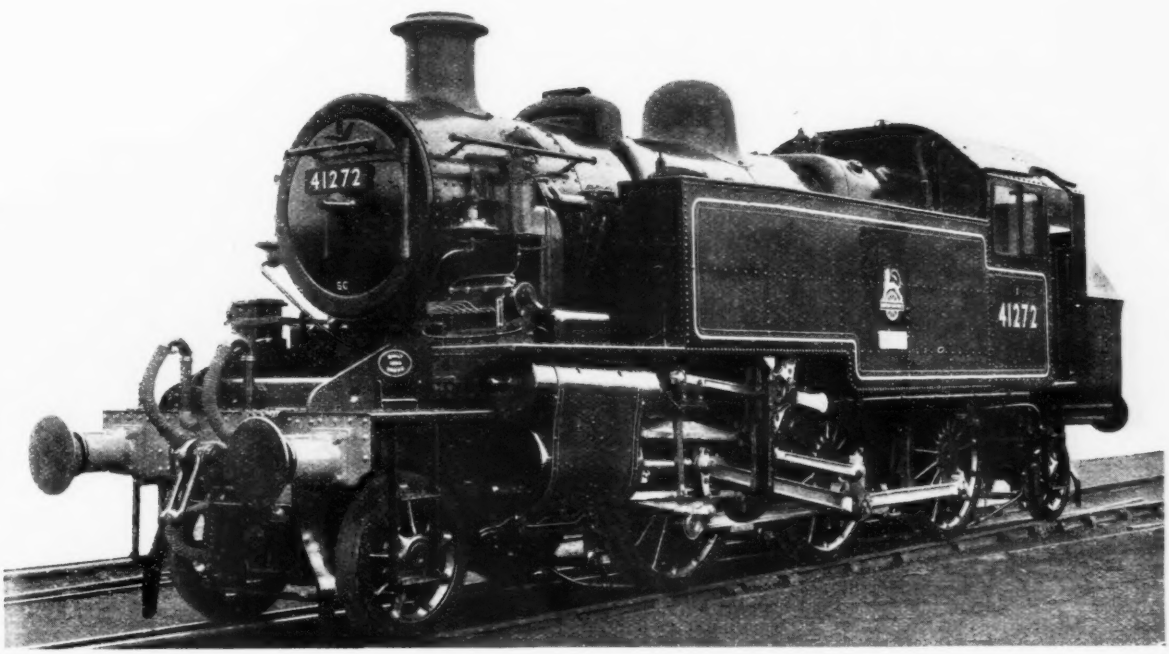
London Midland Region locomotive No. 41272, the 7,000th locomotive to be constructed at Crewe, left the works on September 15. She bears on each side a simple plaque to commemorate her significance in the history of the world's best-known railway workshops.

It is 105 years since Crewe turned out its first engine *Columbine* which worked for 57 years and is now preserved in York Railway Museum. When this locomotive was built Crewe Works occupied three acres and employed 161 men, and it was 21 years before the 1,000th locomotive was completed. As the works expanded, however, so the rate of the building increased, and the second 2,000 locomotives were constructed in ten years.

Production afterwards was not so rapid, but the 5,000th locomotive *Coronation* was completed in 1911. Today more than 7,400 men and women are building and repairing London Midland Region locomotives at Crewe over an area of nearly 137 acres, and the average output of new engines is between 50 and 60 a year.

New Roof at Liverpool Exchange Station.—Work has begun on the renewal of Liverpool Exchange Station roof which was severely damaged during the war by air raids. Temporary repairs were effected by replacing some of the glass with corrugated iron slats, but these are no longer watertight. Eight bays of roofing will be removed from the departure end of the electric line platforms, and the steelwork used to replace the missing trusses on the Lumber Street side. The reduced roofing over the electric line platforms will be sufficient to cover the longest trains using them. The whole area will be made good by fixing new sheeting and patent glazing arranged to provide the maximum amount of daylight on the platforms. The covering on the electric lines will be replaced first.

Plaque for L.M.R. engine No. 41272



London Midland Region locomotive No. 41272 *recently completed at Crewe Works*

London Midland Region Stations Renamed

The London Midland Region has announced that on and from Monday, September 25, 1950, Rugby London Midland Region Station will be re-named Rugby Midland to avoid confusion with Rugby Central Station, on the former Great Central Line. At the same time, Chalk Farm (Broad Street-Watford electric line) is to be renamed Primrose Hill, and Camden Town, on the same line, Camden Road. Other L.M.R. stations in the London suburban area also to be renamed are (with new name in italics in parentheses):—Aylesbury (*Aylesbury High Street*); Dunstable (L.M.R.) (*Dunstable North*); Harpenden (L.M.R.) (*Harpenden Central*); Harpenden (E.R.) (*Harpenden East*); Luton (L.M.R.) (*Luton Midland Road*); Luton (E.R.) (*Luton Bute Street*); Mill Hill (L.M.R.) (*Mill Hill Broadway*); Rickmansworth (*Rickmansworth Church Street*); Stanmore (*Stanmore Village*); West Hampstead (*West Hampstead Midland*). The new name signs will be of vitreous enamel, with white Gill Sans letters on a maroon background. A prominent sign will be fixed on the main entrance at each station and there will be small tablet name signs displayed along the platforms, supplemented by large name signs at the ends.

Rolling Mills at Rogerstone

The recently completed continuous-type strip mill of the Northern Aluminium Co. Ltd. at Rogerstone, Monmouthshire, was opened officially by Mr. G. R. Strauss, Minister of Supply, on September 22. Speaking at the inaugural luncheon at Rogerstone, Mr. Kenneth Hall, Managing Director, Northern Aluminium Company, said that in August, 1939, the company was asked by the Minister of Supply to undertake the erection and operation on its behalf of an aluminium sheet and extrusion works incorporating some of the existing buildings. The outbreak of war in September, 1939, gave this so much urgency that the first casting unit was brought into operation in January, 1940. With subsequent additions to the works the output during the war was approximately 30 per cent. of the entire output of aluminium sheet and extrusions in this country.

The end of the war, said Mr. Hall, posed serious problems for the aluminium industry, which under the pressure of war had expanded seven fold, and in order to meet the inevitable impact of world competition and to expand peace-time uses of the metal it would be necessary to undertake rolling of aluminium on a continuous basis and at the lowest possible cost. Some of the applications of aluminium were obvious, but not so obvious was the growing use of aluminium on a number of factors, such as passenger and goods vehicles, railway rolling stock, housing, and so on.

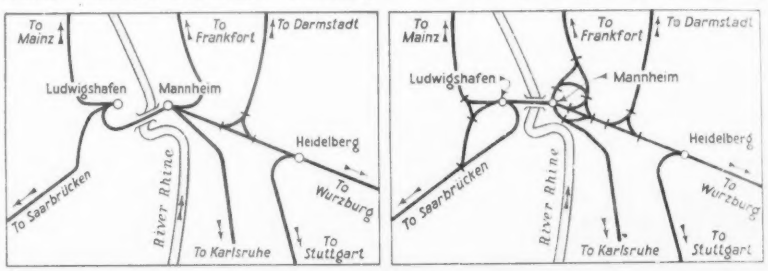
Mr. Strauss welcomed the addition to the productive capacity of the country and referred to the fact that our standard of living depended on the continued improvement and progress of industry. He hoped that the new works, with its potential productive capacity, would encourage the establishment of ancillary light industries in the area. A further important benefit should result in the increase in traffic by the import of raw materials and the export of manufactured goods through the South Wales ports.

Mr. Strauss emphasised that the establishment of the new works would go far towards alleviating any economic distress that might arise in the district, and he paid a tribute to the company for its research programme which, he understood, had involved an expenditure of £100,000 in this country and an equal sum in Canada. This would no doubt be a major factor in ensuring the long-term market for all the aluminium sheet the mill could produce.

A description of the new mill, together with illustrations will be given in a future issue.

Re-planning at Mannheim

The devastation in the twin towns of Mannheim and Ludwigshafen has given impetus to proposals for the re-planning of the extensive railway installations in the area. Efficient railway operation is impeded by the existence near each other of one terminus (Ludwigshafen) and two other major stations (Mannheim and Heidelberg), which require reversal of the most important trains. If the two stations at Mannheim and Ludwigshafen could be re-arranged to provide through facilities for these trains, communications between Mainz, Frankfurt, Darmstadt, Würzburg, Karlsruhe, and Saarbrücken could be speeded up appreciably. The German Federal Railways have accordingly formulated proposals for converting Ludwigshafen terminus into a through station.



(Left) existing, and (right) proposed layout of lines in Mannheim district

The existing railway installations at Mannheim are a formidable barrier between the town centre and the banks of the Rhine, where a large area would otherwise be available for residence and recreation. The latest official plans attempt to mitigate this by raising the railway embankment so that further underbridges can link the town centre with the riverside area. This is opposed by other town planners, who insist that it would perpetuate the effect of a large embankment cutting the town in half. A further complication is that communications between Mannheim and Ludwigshafen are at present confined to a single joint road and railway bridge over the Rhine.

As an attempt to solve these problems, three young architects, W. Bartsch, G. Nöbbe, and W. Schoedon, collaborating with railway experts of the Darmstadt University of Technology, have worked out an interesting set of proposals published in the May, 1950, issue of our contemporary, *Die Neue Stadt*.

According to these, Mannheim Central Station would be moved slightly further east, where the high-level east-west platforms would be supplemented by a number of low-level platforms running north to south. The latter would be used by the north-south through trains (Frankfurt-Darmstadt) and also by terminating trains from the east, north, and south, which would be worked over an ingenious system of loops to reach the carriage sidings without change of engine. There would be convenient interchange facilities between the high- and low-level platforms which intersect at right angles.

The eastward removal of the station would allow the diversion of the Rhine crossing to a new rail and road bridge further south, so that the large riverside area would no longer be cut off from the town centre. At Ludwigshafen side the proposed railway diversions to the south would fit in with the plans for making the terminus into a through station.

Replacement of Timber Bridge at Tibshelf

The timber bridge carrying the Mansfield - Matlock road over the main line from Sheffield Victoria to Marylebone near Tibshelf Station is to be replaced by a steel structure. Upwards of 60 years old, the present bridge, which is 50 ft. above rail level, is a fine example of carpenter's work in making elaborate, heavy timber trussed girders and trestles of great height, but owing to its age and the need for widening, complete reconstruction was considered necessary.

The existing five-span bridge will be replaced by a steel structure of three spans, the longest of which will consist of steel plate girders 131 ft. long by 10 ft. deep. Carried on these girders a precast concrete floor will accommodate the new 30 ft. carriageway and footpaths 7 ft. 6 in. wide.

The reconstruction is being carried out by British Railways (Eastern Region) with their consulting engineers and contractors, and with the co-operation of the Derbyshire County Council who are interested in the widening and improvement of the roadway.

RECORD AUGUST TOURIST ARRIVALS. Another tourist record was broken during August, when 69,637 overseas visitors arrived in Britain. Sir Alexander Maxwell, Chairman of the British Travel & Holidays Association, said recently that this was 37 per cent. more than the average pre-war figure for the month and 9 per cent. more than in August of last year. Despite the world situation, 19,236 American tourists arrived, nearly 19 per cent. more than in August, 1949, and in addition 5,707 Americans passed through Britain in transit to other countries. American tourists spent over 6,000,000 dollars in the country during August, excluding fare payments to British shipping and airline companies, an expenditure representing 20 per cent. of the value of all visible exports to America during the month. Including Empire and Commonwealth visitors, nearly 450,000 tourists have visited Britain in the first eight months of this year. This is 11 per cent. more than for the same period last year which itself established a record.

Improved Smoke Emission Equipment

In the July, 1950, issue of our contemporary, *Der Eisenbahnbau*, of July, 1950, Herr Paul Strothotte, a German railway official at Kassel, describes successful experiments made at a locomotive shed at Bebra with a patented device to improve the smoke emission and ventilation. The air vents in the skylight used for such sheds are usually protected by horizontal boards fitted one above the other at about 4 in. intervals with a cross-section slightly sloping outwards to prevent the entry of rain water. Unfortunately, this outward slope impedes the escape of the smoke gases which tend, with the rain water, to form sulphurous acid and destroy the wood. With low ambient temperatures or a strong wind, cold air will enter the shed and, through its heavier specific gravity, repress the hot smoke gases and steam which must seek other outlets across the shed.

The new device which has been fitted only to a part of the skylight vents of the Bebra sheds to permit comparisons, consists of a kind of vertical, overlapping Venetian blinds with an S-shaped cross section. Wind pressure from outside creates zones of under-pressure in the interstices between the individual bars so that the entry of the outside air is prevented, and the inside air is sucked out in spite of the outside wind pressure.

This effect was successfully tested last January, on a day with 36° F. outside temperature and a wind velocity of 16 ft. per sec., when the smoke continued to escape through the patented blinds but not through the conventional vents.

These blinds can now be manufactured of plastics which are unaffected by sulphurous gases and acid fumes, and have easily cleaned smooth surfaces. The experiments are being continued and extended to individual smoke chimneys to gain further experience on the most suitable dimensions to be adopted.

Questions in Parliament

Atmospheric Pollution

Commander A. H. P. Noble (Chelsea—C.) on September 19 asked the Minister of Health whether he was aware of the nuisances caused by the pollution of the atmosphere by gases from the British Electricity Authority station at Battersea and by the emission of grit from the London Transport station at Lots Road, and what steps he had taken to prevent these nuisances.

Mr. A. Blenkinsop (Parliamentary Secretary to the Ministry of Health) stated in a written answer: It is for the British Electricity Authority and London Transport Executive to take any necessary steps for this purpose. I understand that steps are being taken to bring into operation additional gas washing plant at Battersea, and that at Lots Road additional grit-arrestment plant, which should make grit emission negligible, is nearly complete.

Export of Machine Tools

Mr. P. W. Donner (Basingstoke—C.) on September 19 asked the President of the Board of Trade what was the number and value of machine tools exported to Poland and the Union of Soviet Socialist Republics since January 1 last.

Mr. Harold Wilson (President of the Board of Trade) in a written answer stated: Exports of metal working machine tools to Poland and the Soviet Union in the first seven months of this year numbered 293 and 103 valued at £492,235 and £471,337 respectively.

Iron and Steel Service Contracts

Mr. A. C. Bossom (Maidstone—C.) on September 19 asked the Minister of Supply if it was proposed that the five persons appointed to the Steel Board would be given contracts of service and if he would give the details.

Mr. George Strauss (Minister of Supply) in a written answer said that in accordance with the terms of the Iron & Steel Act the Chairman and members of the Iron & Steel Corporation would be appointed by him and would hold and vacate office in accordance with the terms of their appointment.

Lord Lucas at Polmadie Motive Power Depot

Lord Lucas, Parliamentary Secretary to the Ministry of Transport, paid a visit recently to Polmadie Motive Power Depot, Scottish Region, and the photograph reproduced above shows (left to right) Mr. R. F. Harvey, Motive Power Superintendent, Scottish Region; Lord Lucas; and Messrs. G. Lutterell, Assistant District Motive Power Superintendent, Glasgow (South); R. Wright, Private Secretary to Lord Lucas; T. F. Cameron, Chief Regional Officer, Scottish Region; and T. H. Moffat, Deputy Chief Regional Officer

ABSTRACTS OF RECENT PATENTS*

No. 580,599. Traffic Control

Westinghouse Brake & Signal Co. Ltd., of 82, *York Way, London, N.*1. (*Assignees of F. H. Nicholson, of* 11319, *Frankstown Road, Penn., Allegheny, Pennsylvania, U.S.A.*) (*Convention date*: *August* 1, 1944.)

In a system of traffic control, the determination of whether a section is occupied or not is done by transmitting a beam of ultra-high frequency radio waves along the track so that it is interrupted by any train which is in its path. The invention is described as applied to a stretch of single track railway between two sidings, for controlling the governing signals *RA, RB, LA, LB*.

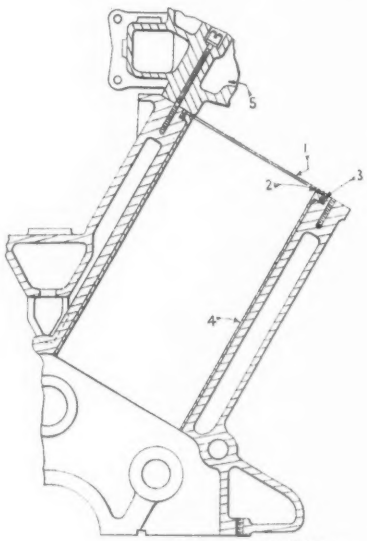
When an eastbound train approaches, control relay *SR*1 is energised by centralised traffic control, and closes its contact 1 to switch on transmitter *OS*1, which transmits from aerial *TE*. The beam is received on aerial *RE* and passed to receiver *DA*2, which thereupon operates relay 2. If signals *LA, LB* are correctly set to "stop," associated contacts 3, 4 are closed and a circuit is completed over relay contact 5 to switch on transmitter *OS*2, which sends a second beam from aerial *TW* to aerial *RW*.

The associated receiver *DA*1 operates relay 6 and a circuit is completed through its contact 7, and also contact 8 of *SR*1, to move the appropriate signal *RA, RB* to "clear," according to the position of contact 9 associated with switch *SW*1. If the section is occupied no beam can reach either receiving aerial and signals *RA, RB* cannot be set to "clear." Similar operations occur when a train approaches from the opposite direction. If the observed section is curved, the beam is made to follow it by suitably placed relay transmitters or re-radiators.

No. 582,376. Cylinder Head Gaskets

Ford Motor Co. Ltd. of 88, *Regent Street, London, W.*1. (*Convention date*: *May* 17, 1943.)

Instead of using a cylinder head gasket common to all the cylinders in a block, a separate annular gasket is used for each cylinder. This provides a better seal in engines working at high pressures and assists heat conduction between the head and cylinder block, as they are in direct contact over the greater part of their area.



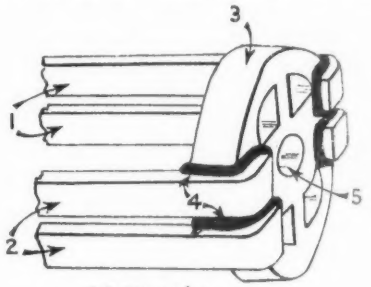
R.G.582,376/44

The gasket 1 is an annulus of soft metal having concentric corrugations 2 and having a flange 3 for locating the gasket by engaging in a recess formed between the rim of the cylinder liner 4 and the cylinder block casting. When the head 5 is tightened into position the corrugations are flattened between the head and the depressed rim of the liner 4, so that the surface of the head and block are in close contact to assist heat conduction. If there are oil or other ducts passing from the block to the head, the joint is sealed by a circular deformable gasket located in the oppositely countersunk extremities of the ducts.

No. 582,118. Drawbar Cradles

G. W. Williams of 19, *Alexandra Road, Gloucester*. (*Application date*: *August* 28, 1944.)

Drawbar cradles for continuous drawgear are made lighter than the cast type by the use of welded forgings. In one form, two slide members 1 and 2, on each side, running the length of the cradle, are bent around shaped end pieces 3 and welded at 4 to form a rigid structure. The drawbar bolt passes through a central hole 5. In other forms the side members are not bent round the end piece but either project slightly beyond it, so as to give an adequate welding area, or are set in a recess in the end piece before welding.



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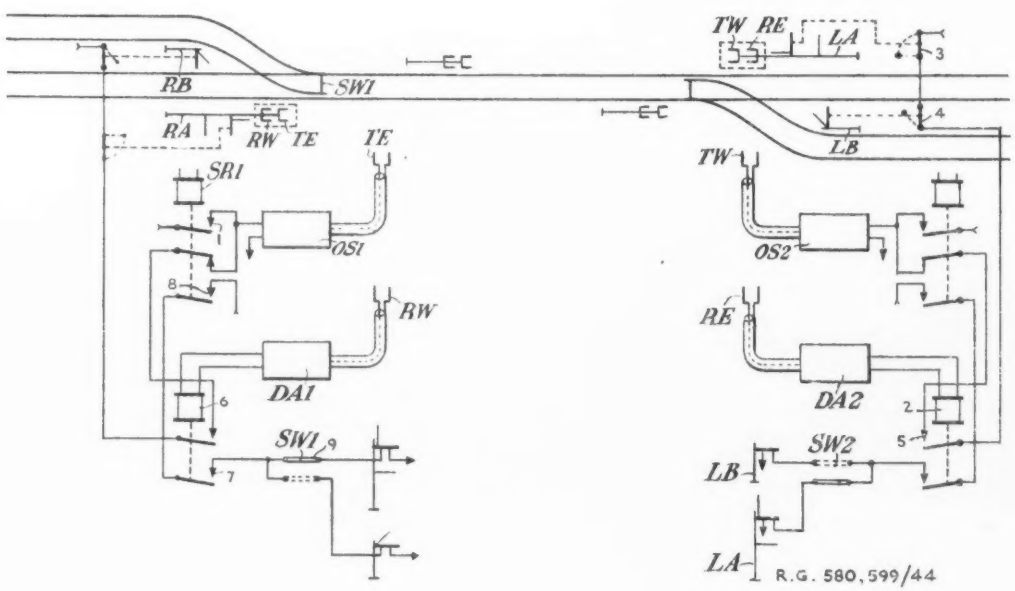


R.G. 580,599/44

* These abridgments of recently published specifications are specially compiled for *The Railway Gazette*, by permission of the Controller of His Majesty's Stationery Office. Full specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

OFFICIAL NOTICES

SITUATION VACANT. ENGINEERING ASSISTANT, Permanent Way Department, Central Railway, Peru. Salary from £1,000 per annum. Knowledge of Spanish essential. Apply to Secretary, THE PERUVIAN CORPORATION, LIMITED, 144, Leadenhall Street, London, E.C.3.

RAILWAY MAINTENANCE PROBLEMS. By H. A. Hull (late District Engineer, L.M.S.R.). Valuable information. With much sound advice upon the upkeep of permanent way. Cloth. 8½ in. by 5½ in. 82 pp. Diagrams. 5s. By post 5s. 3d. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

JUNIOR Assistant Sectional Engineer or Sectional Engineer required for British Railway Company operating Chile and Bolivia. Candidates should have passed Sections (A) and (B) of Institute of Civil Engineers examination and have had some experience in maintenance and construction of track work, bridges and buildings. Aged about 25/35 years, married or single. Commencing salary £600/£750 p.a. according to qualifications and experience. Free quarters, passages, allowances, etc., provided. Applications with full particulars of qualifications and experience and copies of any testimonials held to be sent to Box 3679, c/o CHARLES BARKER & SONS LTD., 31, Budge Row, London, E.C.4.

ASSISTANT WORKS MANAGER required with experience heavy engineering and timber construction. Position offers good prospects for satisfactory man. Apply with full particulars, training experience and salary required to the Managing Director, THE BIRMINGHAM RAILWAY CARRIAGE & WAGON CO. LTD., Smethwick 40, Staffs.

SITUATION VACANT.—District Traffic Superintendent. Salary £1,000 per annum. Knowledge of Spanish essential. Apply to Secretary, THE PERUVIAN CORPORATION LIMITED, 144, Leadenhall Street, London, E.C.3.

Notes and News

Leyland Vehicles for South America.—Leyland Motors Limited announce that they have received orders totalling £500,000 from Brazil and Uruguay for more than 200 passenger chassis and Comet diesel trucks. These new contracts bring export orders in hand to well over £5,000,000.

Railway Benevolent Institution Grants.—At a meeting on September 20 the board of the Railway Benevolent Institution granted annuities to six widows and ten members involving an additional liability of £286 12s. a year. Also 43 gratuities were granted totalling £469 10s. to meet cases of immediate necessity. Grants made from the casualty fund during August were £585 10s. 6d.

South London Tramway Conversion.—On the night of September 30 - October 1 stage one of the London Transport Executive scheme for converting South London tram routes to bus operation came into effect. This first stage of the scheme, referred to in our July 7 and 21 issues, consists of the replacement of five tram routes and a short trolleybus route by five new bus routes, and affects all tram services in Battersea and some in Camberwell, Chelsea, Finsbury, Holborn, Lambeth, Southwark, Wandsworth and Westminster. In working out details of the scheme as a whole the opportunity has been taken where possible of reorganising services to make additional bus stands and terminal workings in the Central Area unnecessary and thus avoid the creation of new centres of road congestion. At the same time, however, every effort has been made to avoid altering routes to which the public has long been accustomed.

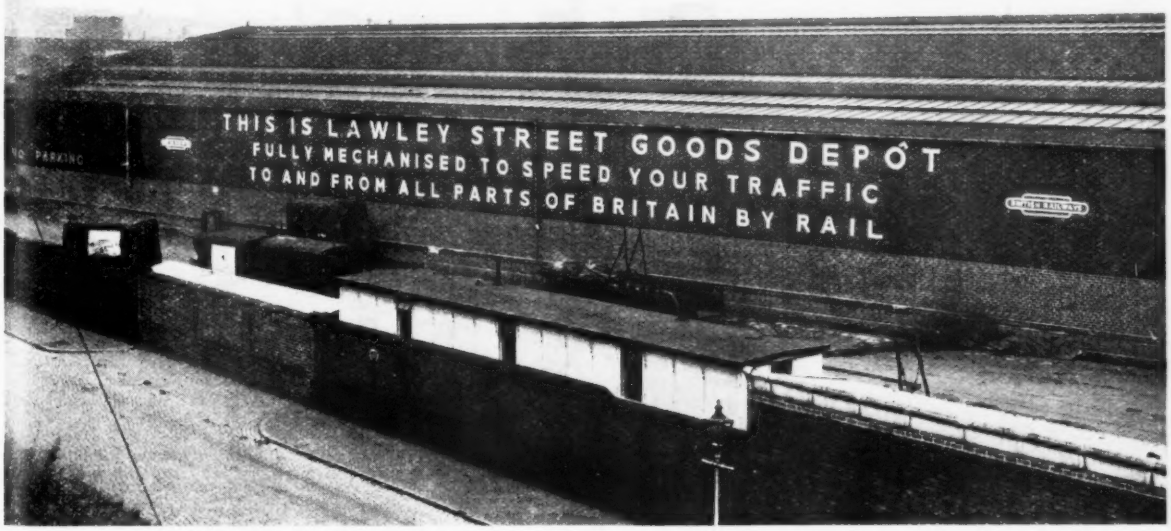
Transport Equipment (Thornycroft) Limited.—Transport Equipment (Thornycroft) Limited has appointed King & Harper Limited, Hills Road, Cambridge, service agents in the Cambridge area. This firm is equipped with plant adequate to carry out all types of repairs to Thornycroft petrol and oil-engine vehicles and to operate the Thornycroft reconditioned engine exchange scheme which covers the various power units produced by the company.

Sixty Years of Dunlop Tyres.—The development of Dunlop pneumatic tyres from their invention over 60 years ago by John Boyd Dunlop, a Scottish veterinary surgeon practising in Belfast, down to the present day is depicted in a new film produced for the Dunlop Rubber Company. Entitled "Endurance," the film centres on the Le Mans 24-hr. road race, and the earlier history of the Dunlop tyre is shown by means of flashbacks incorporated in the story. There are also a number of scenes of tyre manufacturing processes taken at the Dunlop works. The film will be shown to some 7,000 dealers in the provinces during the fortnight before the motor show. Michael Medwin, Guy Middleton, and Sean Lodge are the stars who take the principal parts in the film.

Fares Cut on Channel Car Ferry.—From September 19, Silver City Airways are to cut fares on their cross-Channel car ferry service. The rate for cars not exceeding 14 ft. in length will be cut from £27 to £19 and for larger cars from £32 to £25. Already this summer Silver City freighters have carried over 2,000 cars between Lympne and Le Touquet, compared with the 15,000 cars carried between Dover and Boulogne, and Folkestone and Dover, by the Southern Region of British Railways.

Troop Train Accident in U.S.A.—Thirty-two soldiers were killed in a railway accident in the U.S.A. on September 11 when the diesel-hauled passenger express train "Spirit of St. Louis" collided with the rear of a stationary troop train eight miles west of Coshocton, Ohio. The soldiers were on their way to a training

Advertising Mechanised Goods Handling


THIS IS LAWLEY STREET GOODS DEPOT
FULLY MECHANISED TO SPEED YOUR TRAFFIC
TO AND FROM ALL PARTS OF BRITAIN BY RAIL
NO PARKING

An exceptionally large sign, 176 ft. long by 13 ft. deep, has been painted in white letters on the side of the Lawley Street Goods Depot of the London Midland Region, facing the running lines into New Street, Birmingham

camp at Atterbury in Indiana. One of the two locomotives of the express train ran into an engine at the back of the troop train and pushed it into the rear coach, where most of the casualties occurred. There was thick fog at the time of the accident.

Interim Dividend of Vickers Limited.—The directors of Vickers Limited have decided to pay an interim dividend of 2½ per cent., less income tax, on the ordinary stock of the company for the year 1950, payment to be made on October 24.

Imperial Chemical Industries Limited.—The raising of a further £20,000,000 of capital has been announced by Imperial Chemical Industries Limited. The money will be obtained by a private placing of 4 per cent. unsecured loan stock redeemable in 1958-60 and the stock will remain privately held. Consent of the Capital Issues Committee has been obtained for the transaction. For a number of years I.C.I. was able to finance the large construction programmes out of earnings, but post-war development on a rising price level has now made this impossible.

Luminous Paint for Railway Advertising.—Luminous red paint, used in railway poster work for the first time in this country on the 12 ft. 6 in. × 13 ft. 6 in. poster outside York Station, makes the word "ILLUMINATIONS" glow like a Neon sign. The photograph reproduced below shows clearly the difference in brightness between the word "ILLUMINATIONS" and "BLACKPOOL" and "MORECAMBE" which are in standard poster red. The enhanced lighting on the promenade and pier in the lower part of the poster is produced by the use of yellow, red, and green luminous paint.

Liverpool Overhead Railway Traffics.—Total receipts of the Liverpool Overhead Railway during August showed a decrease in three of the four weeks and an increase in the remaining week. For the week ending August 6 receipts amounted to £2,778, £88 more than in the corresponding week of 1949. The largest decrease was £132 for the week ending August 13, when receipts were £2,871 against last year's figure of £3,003. Aggregate receipts by August 27 amounted to £87,500 compared with £94,148 for the same period of 1949.

Glass Batteries for Signalling Equipment.—An alkaline accumulator in a glass container, claimed by the makers to be the first of its kind, has been manufactured for railway signalling purposes by Nife Batteries, of Redditch, Worcs. The accumulator has been specially designed with the object of simplifying and reducing maintenance work while retaining the advantages of the standard steel types of steel cell. The larger container holds a greater bulk of electrolyte, which should not need renewing completely more than once in four or five years, and the glass provides excellent insulation from earth under the worst conditions of condensation.

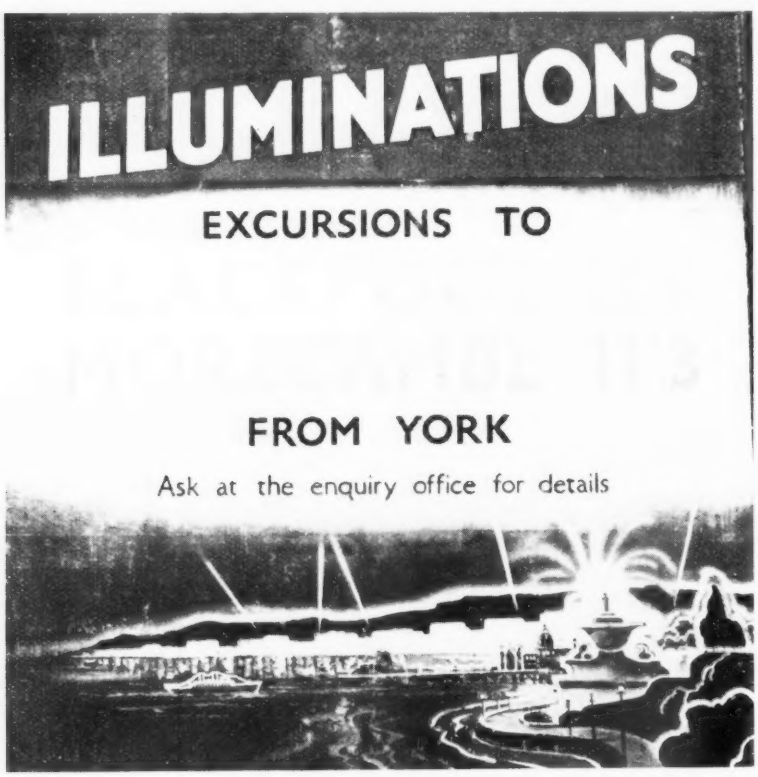
European Highways Projects.—Plans for international arterial roads were agreed at a recent meeting of the Inland Transport Sub-Committee of the United Nations Economic Commission for Europe. They include a transalpine road from Western Switzerland and Savoy to Italy, either from Martigny, in the Rhone valley via the Great St. Bernard pass, or from Geneva via Mont Blanc, to Aosta, in Piedmont; either route involves a long alpine tunnel (which is not, however, included in the estimated costs), and would form a trunk route across the Alps between the present Simplon and Mont Cenis rail routes. No mention was made of a Channel tunnel. Provision is made in the plans for abolition of level crossings.

Newham Station Closed.—With the close of work on September 23, Newham Station, in the North Eastern Region, British Railways, has been closed to goods and passenger traffic, but alternative facilities are available at Chathill Station, about a mile away. Newham Station is on the main line between Newcastle and Berwick, about a mile north of Chathill.

The Theory and Design of Welded Structures.—A series of lectures of an advanced character intended for civil and structural engineers, designers and draughtsmen on the theory and design of welded structures will be held at the Northampton Polytechnic, St. John Street, London, E.C.1, on Monday evenings this winter. The first of the lectures, which will be given by Mr. R. J. Wilkins and Mr. O. Bondy, will be held on October 9, and admission to the course, which costs 30s., is by application to the Polytechnic office.

Technical Developments in Hydro-Electric Power.—Three films demonstrating the progress of hydro-electric power schemes, and the subsequent transmission of the power by high-tension cables, were shown in London last week by Enfield Cables Limited, who will subsequently show the films in the provinces and overseas. Lord Verulam, Managing Director of Enfield Cables Limited, supplied the commentary for the first film, which depicted the harnessing of water power in Switzerland, and the others showed the building of a 600-mile transmission line in Sweden and the construction of the great Shipshaw hydro-electric scheme in Canada. There was also another film, on the nature of electricity. Afterwards Lord Verulam described some of the recent work on which his firm has been engaged, and explained, with the help of a model, the workings of the 100-kW. wind-driven generator ordered by the British Electricity Authority for erection in Wales in 1952.

Coryton Refinery.—The Boards of Powell Duffryn Limited and of Socony-Vacuum Oil Co. Inc. of New York announce that the property at Coryton, formerly owned by Cory Brothers & Co. Ltd., has been acquired by Vacuum Oil Co. Ltd. As from September 1, 1950, the business previously carried on at Coryton by Cory Brothers will be continued by Vacuum Oil Co. Ltd. as an addition to its present business. Preliminary work for the new oil refinery at Coryton has been completed. The Lummus Co. Ltd. has been appointed principal contractors to the project. Contracts already placed include those for the extension of the private railway, on which work has begun. The target date for the completion of the refinery is January 1, 1953. The expenditure on the refinery and on other works at Coryton and elsewhere will be financed in part by Powell Duffryn and Socony-Vacuum; arrangements have been completed with the Finance Corporation for Industry Limited for the provision of the balance.



British Railways have recently used luminous paint for publicity for the first time and the poster reproduced provided an excellent subject for this experiment (see paragraph above)